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THE
CONGO-RAILWAY
FROM MATADI TO THE STANLEY-POOL

RESULTS OF SURVEY

FIRST DRAFT

CONCLUSIONS

With 24 schedules

MAPS. — PLANS. — ESTIMATES. — SEVERAL NOTES.

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THE CONGO-RAILWAY

From Matadi tot the Stanley-Pool

RESULTS OF SURVEY

FIRST DRAFT

CONCLUSIONS

The survey of the railway intended to connect the lower Congo with the Stanley-Pool is now entirely completed; the first draft and the estimates have been laid down according to the plans drawn up by the engineers.

We here intend to make known the results of this work in order that every one may be acquainted with the circumstances under which the railway can be laid and worked, and be able to judge with a thoroug knowledge of the matter, whether capital employed in the laying of the railway has a chance of proving remunerative.

Let it be said at once that the time seems to have come, when capital should resolutely make the conquest of this new field of equatorial Africa, hitherto virgin, — at least in its central regions — of any commercial or industrial enterprise.

The interior political situation of the independent State of Congo has, in a few years, affirmed itself with a wholly unprecedented surety and rapidity. A simple legislation inspired by the most liberal ideas has been created at one cast, so as to ensure the respect of individual rights, and to afford to real estate that stability which it wants to have in a constituted State. The authority of the State has been established without any shock to the most distant regions attainable by the steamers ploughing the waters of the Upper Congo; we dare to affirm that to day security is absolute in the cataract region.

In this summary we content ourselves with indicating theresults of the works in which we have been engaged — details will be annexed in the form of notes. Those desirous of more completely studying the question will, we believe discover in those schedules the numerous elements pertaining to the Congo-Railway undertaking.

Accordingly the schedule n° 1 will be found to contain a brief historical summary of the question. N° 2 will acquaint the reader with the instructions issued to the engineers entrusted with the actual survey on the ground. This survey carried out by 14 engineers resulted after a 16 months labour on the Congo (see Schedule n° 3) in the drawing up of a plan to the scale of 1/2500 and figuring the ground with equidistant curves of five metres.

The plans drawn up during the first campaign were brought home to Europe in March 1888. The studies of calculation begun at once comprising successively the drawing up of longitudinal and lateral sections, the calculation of cuttings and embankments and the constructive works.

We annex two complet extracts of the said survey, the first relating to a portion surveyed on difficult ground (see schedule n° 4); the second, comprising the studies of section surveyed in easy ground (see schedule n° 5).

The estimate of expenses was then drawn up (see schedule n° 6). — The schedule n° 7 contains the justification with various notes of the figures adopted for those estimates : price of lineal metre of railway, of cubic metre of masonry, lineal metre of aqueducts, etc.

Finally the general estimate of the whole undertaking could be made up (see schedule n° 8).

The latter came to the conclusion that a capital of TWENTY-FIVE MILLIONS OF FRANCS would be sufficient to lay the line, to purchase the rolling stock, to cover the general expenses in Europe as well as in Africa, to pay the intercalary interests during the period of laying, estimated at 4 years.

After all the railway, which is proposed to be laid in the cataract region according to the above survey, plans and estimates will have a rail-gauge of 75 centimetres, with steel rails weighing 23 kilos, steel sleepers at equal distances of 80 centimeters and weighing 23 kilos, the whole of the line weighing 75 tons per kilometer.

The total length of the line will be 435 kilometers; the laying of the first 26 kilometres only will offer some important difficulties, while the remainder of the line will be laid under exceptionally easy circumstances either in plains by straight lines, or along the hill sides by means of curves of great radius.

The earth-work of the first twenty six kilometers not only will be much more considerable, but a great deal of it will have to be done by excavating the rock, while farther the cuttings can be proceeded with in argillous ground and nearly always in sandy and friable earth.

In consequence, though the earth works of the first part will necessitate an expense of 57,741 francs per kilometer, those on the remainder of the line will only cost 4,472 francs per kilometer. Likewise, on the first portion the masonry of the retainingwalls will cost 9,106 francs per kilometer, while farther the cost per kilometer will be reduced to 24 francs.

During the first 26 kilometers, where special precautions will have to be taken in order to facilitate the draining of waters, the cost of establishing aqueducts of pressed beton, will amount to 4,620 francs per kilometer, and that of building bridges and culverts with metallic superstructure to 11,302 francs per kilometer, while beyond Palaballa those expenses will be reduced respectively to 1,519 francs and 4,575 francs per kilometer.

On the other hand, the expenses to be incurred by the laying of the line will naturally increase with the distance, in consequence of the higher rate of transport along the line; from 18,500 francs per kilometer during the 26 first kilometers, they will increase for the latter section of 60 kilometers towards the Pool, to 21,770 francs per kilometer.

If we except the first part there will be few constructive works, the most important of them being a bridge of 100 meters across the Inkissi, two bridges of 80 meters across the Mpozo and the Quillou and six bridges ranging between 40 and 60 meters; the others will have a length of from five to twenty metres only in the clear.

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The construction of the abutments of bridges will be everywhere very easy as firm soil is to be met with at no great depth from the surface of the ground.

Nearly everywhere, except on the first section, the nature of the soil will admit of bricks being made, and in the valleys of the Luima, of the Unionzo, Quillou and Inkissi, lime stone is to be found in abundance. Fragments of quartzite and sand, everywhere to be met with, will supply the ballast.

The maximum of incline will be 46 m.m. per meter and will be reached three times during the first portion, where as a rule steep inclines will be met with.

Nevertheless it has been possible to combine the slopes and horizontalness so as to render traction as easy as possible, and during the last 400 kilometers the slopes and inclines are very unfrequent and generally insignificant.

Likewise in the first section curves are rather numerous and of short radius, although the latter will never be less than 50 meters.

Thus all the difficulties of laying and working accumulate at the starting point, a most fortunate circumstance as the first section also offers greater facilities for laying, and on the other hand by establishing a twofold traction for the 26 first kilometers and reorganizing the trains beyond Palaballa, it will be possible to work the whole of the line under far greater economical conditions, than if the working difficulties had to be dealt with at some distance from the starting point.

The locomotives when loaded will weigh 30 tons and drag with the speed of eighteen kilometers per hour an average useful load of 50 tons. The capacity of transport is superior to any traffic to be foreseen for a long period; as one train per diem in each direction represents a total movement of 36,000 tons along the line and, if necessary, a service of eight daily trains might be organized without difficulty.

The starting-point of the railway on the lower Congo will be at Matadi, a point which is easily reached by sea-going steamers (see the note, schedule n° 9) and where unexpensive works will easily allow of those steamers to unload their cargo on waggons.

The terminus of the railway at the Stanley-Pool will be at Ndolo at a little distance above Kinchassa, and also above all the rapids wich hinder navigation in the cataract region. Beyond this point light draught vessels can ascend the Congo and its affluents for an uninterrupted length of 11,500 kilometers. Ndolo is admirably situated for the building of spacious quays.

Matadi and Ndolo will be the two principal stations; a second class station will be erected in the district of Kimpésé, where travellers will stop, as two days will be required to pass the distance between Matadi and Stanley-Pool, the trains will not run by night. Three other stations shall be established along the line, one at the Loufou, another at the Inkissi and a third at Ntampa, thus dividing the total distance between the lower Congo and the Stanley-Pool into five sections of an average length of 85 kilometers each, and each section being itself divided into 4 sub-sections by 3 halting-places, with water-tank and crossing-way.

Under such conditions the working expenses of the line, supposing two trains per week in every direction, will amount, according to calculations (see schedule 10) to about 1,200,000 francs.

Adding to this 1,250,000 francs for the payment of interest at the rate of 5 °/₀ on the building capital, receipts to the amount of 2,450,000 francs would suffice to enable the railway to prove remunerative from the first year of working. Now the Independent State of Congo, the tradinghouses, the missionaries, in short all who must actually operate transports between Matadi and Stanley-Pool, would realise considerable savings by making use of the railway even by devoting the same sums to their transports. We need hardly point out that the actual mode of transport in the cataract region offers no guarantee either as concerns safety or dispatch. Many goods arrive in a damaged state and sometimes loads are several months on the way before reaching the Pool. Besides the consequent loss of interest, commercial transactions are constantly crossed by the want of necessary stock owing to the insufficient means of transport.

We may add that transport by means of carriers necessitates the weight of loads being limited to 65 pounds (english weight) and that the numerous precautions which must be taken, in order to avoid as much as possible any damage of contents involve costly package, which transport by rail would of course greatly simplify. Likewise transport of passagers being carried on by rail, would also greatly diminish the expenses, supposing even that the actual fares were maintained.

The agent would then reach the Pool in two days, while now the journey necessitates a month, during which period he renders no services — which means a dead loss for the State, or the trading house who employs him — and after which he arrives to the end of its journey exhausted and very often ill.

This simple reasoning proves that the sums actually spent for transport in the cataract region may be considered as representing the absolute minimum of receipts, which the first years's working will enable the railway to yield. The schedule n° 11 shows that the said sums are at any rate superior to 2,500,000 francs, and consequently sufficient to insure interest at five per cent on the capital employed in the laying.

It must also be remembered that between the period which will elapse from this day, to the achievement of the line, transports will surely have assumed extensive proportions, as is proved more than enough by the increasing progress for the last eight years (see schedule n° 12 : history of transports by means of carriers in the cataract region).

This is all the more true as up till now the number of loads transported has been limited only by the requisite number of carriers. Consequently, when the laying of the railway will have penetrated a certain distance inland, it will be possible to carry on transports by rail over all that part of the line already laid, thus accumulating on a shorter distance the available carriers, so that when for instance the line will have reached half-way to the Pool, that portion of the country, where transport will have to be carried on by natives, being reduced by half, the number of loads available for transport will be doubled. Besides there is no doubt that the aliments of transport will immensely increase with the opening of the railway. The Upper Congo and its navigable tributaries constitute an immense system of natural communicationways, affording 23,000 kilometers of banks (see schedule n° 13) and bathing the enormous area of 1 million of square kilometers, inhabited by a numerous population which Stanley estimates at 29 millions.

All these native tribes are thirsting for goods of European manufacture, and their very fertile soil enables them to offer us in return raw materials very valuable for the industry of the old world.

At the present time ivory alone can reach the coast. Six years ago scarcely some single tusks found their way from the Pool towards the sea. Since the opening of the caravan's road, the progress of the ivory-trade has been amazing.

The capital represented by the ivory actually transported certainly exceeds 2,500,000 francs per annum. Before long all the ivory of Central Africa will come down by the Congo, an evident proof of the oftrepeated saying that « rivers are marching roads ».

Rubber has likewise made its appearance on the trade roads, but the value of this produce is insufficient to cover the 1,000 francs per ton, representing the actual cost of transport.

Now the railway will reduce this freight to 250 francs per ton, for instance, and enable the immense quantities of rubber found in Central Africa to be shipped to Europe or America. At Luébo, a station founded only five years ago, a factory of the Belgian Society for the Upper-Congo-Trade have purchased in three months 20 tons of rubber, the prices paid being about twenty centimes (two pence) a pound. The sole reason for stopping purchasing was the running short of goods for exchange. Central Africa can besides offer various other produces — see schedule n° 14.

Considering that this varied natural produce can be harvested on such an immense extent of country as the Upper Congo, and its affluents, the conviction remains that the Congo railway, intended to transport them tho the coast, will soon prove a potent factor for goods.

The objection has been raised that in a country such as the Congo, void of all means of communication, the laying of a railroad would be a matter destined to utter failure from its very rise, as being out of proportion comparatively to the commercial development of the regions it was intended to work.

The objection is simply worthless; in fact, at the navigable terminus of the railway the Congo and its tributaries form an immense road of natural communications, at once cheaper and more adapted to commercial development than any other. Thus the railway will find at its terminus the working facilities, which laterally would fail. Besides one would be wrong to suppose the cataract region totally destitute of produce. It has long been thought that the Congo railway would have a trans-saharian character and be compelled to search for transport only at its extremity. Moreover the cataract region has been painted in very dark colours by most of the travellers, while the whole country, in opposition to some unfertil districts, contains entire regions of remarkable fertility which certainly will contribute their share of produce for the traffic of the railway.

We do not consider it advisable to discuss here the question of the railway rates. This would be premature. The rates will depend on the commercial situation existing at the time of their application. No one can foresee to what extent commerce will have prospered on the Upper Congo four years from hence.

We have endeavoured in this brief summary to remain calme and uninfluenced, and not to dazzle the reader by the figures which would be those of transports if each of the 23,000 kilometers of the Upper Congo and its navigable affluents were to bring some tons only of their produces to the Pool. Let it be remembred that an uninterrupted line representing the banks of the Congo and its affluents, would be equal in length to the coast line of Europe from the Cape North to Constantinople, following the borders of the Frozen Sea, the Baltic, the North Sea, the Channel, the Atlantic and the Mediterranean.

Anyhow the rates will be differential at all events for the coast bound produce, so as to tax each produce proportionately to its value on European markets, and to enable also produce of less value to enter rapidly the commercial movement. Thus a very large figure of business will soon be reached by a scale of rates, considered carefully, reexamined frequently and intended to lead rapidely to cheap rates.

Moreover the receipts for transport will not be the only ones which the capital employed in the railway can expect. In fact the Congo State has bound themselves from now under the terms of an agreement passed with the Compagnie du Congo — see schedule n° 15) — to grant to the building Company as a subsidy 20 °/₀ on all sums realised by export duties, as well as the gratuitous concession of 1,500 hectares of land for every kilometer of railway laid and opened. Of course export duties have been hitherto very moderate; nevertheless their produce has been constantly increasing (¹).

The total concession of land for the 426 kilometers of railway, independently of a zone of 200 metres to the right and 200 to the left of the line, will amount to 655,400 hectares of land with faculty of option anywhere within the limits of the State. There can be no doubt that these concessions will some day acquire considerable value.

We cannot here examine in a detailed manner the question of climate. Experiences of the late years have proved that Europeans can inhabit the Congo for some years and attend their occupations without any serious danger for their health. Mortality decreases every year as comfort and luxuries begin finding their way to the inland.

Is it possible to entertain the hope that some day the white man will be able to inhabit the Congo and multiply? the question is highly debated. We may say however that those who have travelled in the regions of the Upper Lòualaba and Katanga — easy of access owing to the recently discovered navigability of the Lomami — (see schedule n° 16) state that the climate of these regions which possess great mineral richness and where even the existence of gold has been stated, is extremely healthy, temperature never falling under

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(¹) The Compagnie du Congo which meantime enjoy the same subsidy in consideration of the survey of the railway has received 12,000 francs for the survey of the first year, 20,000 for that of the second year, and doubtless these figures will be increased to 28,000 for the third year.

5° C. and that they are convinced that Europeans will be able to acclimatize there and prosper.

Questions allowing of positive answers have often been asked us concerning the railway undertaking. We give them below as well as our exact answers, of which developments will be found in the schedules.

Shall you find among the negroes a sufficient number of workmen to build the railway?

Without any difficulty (see schedule 17). Moreover no doubt can subsist on the subject, since southwards from the Congo, between Saint-Paul de Loanda and Ambaca, the Portugueses have constructed a railway for which only negroes were employed for the earthworks.

Has large cattle been introduced to the Congo, and how does it prosper?

The experiments of the last ten years show that good results are to be expected from the breeding of cattle in the Congo (see schedule 18).

Must one not expect bloody wars with the natives? No, as the social and political state of the negroes — see schedule 19 — is a great warranty of security and the story of the last ten years shows that no serious trouble is to be feared in the Congo.

Do negroes possess commercial aptitudes? Yes, to a very high degree. See schedule n° 20.

Will the use of coin be easily introduced to the Congo? The schedule 21 shows that everywhere real monetary units have been adopted by the negroes; so there is no doubt that they will easily adopt coined money, as it is much easier to be conveyed and kept than the hoes, brass-rods, copper-crosses, which in the several regions are admitted as monetary standards.

Are not land-slips, imperilling the railroad, to be feared during the rainy-seasons?

Yes, more or less on the first portion of the line, but this has been especially taken into account in the working estimates. No, as concerns the latter 400 kilometers of railroad.

Finally we have been asked sometimes if not another large communication can be established to compete with the railway from Matadi to Ndolo.

It is obvious that this would be impossible by water, as there is no possibility of canalizing the Congo, neither of digging a lateral channel.

Moreover a single glance cast upon the map, shows that the railway from Matadi to the Pool crosses a region half as deep on the straight line than would do any railroad to be laid across the Niadi Quillou, and on the other side, the navigable lower Congo forms an immense natural road, capacious to shelder the largest fleets of the world, while on the whole shore from the Gabon to the Congo, there is not a single place suitable for establishing an harbour. We think, however, that we must limite ourselves to set forth here the considerations able to prove that the affair we propose to the public is a good affair. If some day any other similar enterprise were to be undertaken, the sole fact would be a proof of our anticipations being true in the prediction of an immense commercial future of the Congo. That will be the time for those who will then set forth the project of an other railroad than ours, to maintain it and to prove its financial possibility; as for ourselves, we think that it would be useless to discredit in advance any effort made with a view of favouring the commercial development of the Congo.

The conditions of contract are actually under discussion. They grant to the Company the greatest latitude as for the laying as well as for the working, principally with reference to tariffs.

It has been our endeavour to lay before the reader with scrupulous sincerity the railway undertaking in the Congo cataract region. Now it is for the capital to conclude. The question however does not interest capitalists alone.

We appeal to philanthropists and humanitarians desirous of putting an end to the slave trade and its horrors. We appeal to the patrons of science avid of discovering the scientific richnesses which central Afrika has hitherto kept hidden, and finally to the religious and faithful people who see with pain the wretched Africans given over to the practise of idolatrous fetishes.

All those friends of humanity will understand that the Congo railway is the best and surest way of allowing civilization to penetrate in the hidden regions of Africa.

Moreover the laying of the railway is only one episode of the gigantic work conceived and carried on by Leopold II. Like the entire work of the King, it will answer not only a powerful utilitarian interest, but also the noblest feelings of humanity.

Agreed to at the sitting of the general board held on 15th may 1889.

FOR THE BOARD :

The permanent committee :

The Vice-president,
J. URBAN.

The President,
G. SABATIER.

The Deputy-directors,
ALB. THYS, A. DE ROUBAIX.

SCHEDULES

SCHEDULE N° 1.

The Congo-Railway question. – An historical notice.

It might almost be said of the Congo railway that it is a railway of geographical interest, we would almost venture to call it a natural railway.

For it is impossible to study the regions of Central Africa without coming to the conclusion that a railway connecting the admirable system of navigable water-courses of the Upper Congo, with the sea-coast is an absolute necessity. This is all the more true, as after carefully studying the map of the Congo, the mind is intuitively led to span the cataract region by means of a railway, and admit the important evidence of the decisive elements pertaining to the question, viz.·. the immense expanse of fertile regions of the Upper Congo, and the comparatively short development of railway making produce to reach the coast.

Thus, when Stanley after his memorable journey across Africa, made known to the civilized world that a space of only 300 kilometres separated the sea-coast from the magnificent river he had just descended from Stanley-Falls to Stanley-Pool, the question of the Congo railway was naturally and at once brought into evidence. It has been ever since so intimately connected with the question of the Congo itself, that the original idea of this railway is to be met with in everything that has been attempted on the Congo for the last dozen years.

The object pursued by the » Comité d'Études du haut Congo«, the formation of which was the steppingstone to the founding of the Independent State of Congo, was in a great measure the laying of a railway intended to span the cataract region.

Readers of M. Stanley's admirable book (¹) might even be led to believe that the eventual laying of this railway, was the sole object held in view by the promotors of this great work, the political end simultaneously pursued being brought about by the necessity of ensuring to the Congo regions previously stability of institutions and rights of property. « To create, » says M. Stanley stating the hesitations of the promotors of the « Comité d'études du Haut Congo » in determining exactly the plan of the enterprise to be created by them, « a railway for over 200 miles through a little known country would require a preliminary survey of the land through which it was proposed the line should run. An exact knowledge would have to be gained of the laws which govern the natives, of proprietary rights along its proposed course; and of the protections if any, which could be guaranteed by the native chiefs to such a road. »

The whole of Mr Stanley's work giving an account of the labours of the expedition of the Comité d'Études, converges towards the same object, and the admirable chapter headed : « The kernel of the argument » is the most eloquent possible appeal in favour of the railway :

« Of the 325,000,000 people in civilized Europe — exclaims Mr Stanley — there must be some surely intelligent enough to be convinced by the gospel of trade, initiative, activity preached in this chapter. I am encouraged in this belief by the rapid absorption of several ideas which have been promulgated during

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(¹) *Five years on the Congo*, 1879-1884. Brussels, 1 vol. in-8°, 696 pages.

the last few years respecting the Dark Continent. There are enormous richesses expecting the railway intended to gather them. I apply to the trading class and I am sure that my advertisement will not be lost. »

The great explorer's appeal was heard. In November 1885, a syndicate of English capitalists was constituted with a view of obtaining from the Congo State the concession of the railway from the lower Congo to the Stanley-Pool.

The time howevor had not yet come for great enterprises on the Congo. Stability was not yet sufficientley secured. The political work was not sufficiently advanced, so that capital in order to insure its security, was obliged to demand powers which the Congo was unable to grant, so that at the last, the negociations fell through and the English syndicate was dissolved.

Shortly after, the affair was taken in hand on a more modest scale by the « Compagnie du Congo pour le commerce et l'industrie », constituted with a capital of 1 million francs, which sum was afterwards raised to 1,225,000 francs with the immediate object of studying in a practical and definitive fashion the possibility of laying the railway. The statutes were drawn up however in order to allow the Company to become, by simply increasing its capital, the Company for laying and working the railway.

The « Compagnie du Congo pour le commerce et l'industrie » was definitely constituted on the 9th of February 1887. The board of the Company decided on the immediate organisation and departure of two expeditions, one of which would be instructed to draw up the survey of a railway between Matadi and Leopoldville, and choose the best road adapted for the purpose, and the other entrusted with the drawing up of a report on the commercial future of the Upper

Congo. Captain Cambier, who had already twice travelled in Africa, went in command of the engineers entrusted with the survey. M. Delcommune, who had during tweve years been at the head of important trading establishments at the Congo, took the direction of the commercial reconnoitring. Captain Thys, orderly officer to the King and delegate director of the Company, left at the same time in order to assume the direction of the two enterprises and represent the board in Africa.

SCHEDULE N° 2.

Instructions for the Director of survey of a railway from the lower Congo to Stanley-Pool.

The « Compagnie du Congo pour le Commerce et l'Industrie » has undertaken towards the Independent State of Congo to carry out the complete survey of a railway connecting under the most favourable circumstances the lower Congo with the Stanley-Pool.

The railway to be entirely within the limits of the territory of the Independent State of Congo; it may be laid in two sections connected by a navigable portion of the river.

Serious inconveniences militate against the railway being laid in two sections, the latter plan would only be adopted in the event of a continuous line being found to be impracticable or too costly.

At all events, the undivided the line must be situated on the left bank, in order to remain within the limits of the Independant State of Congo. The survey of this inferior part will thus have to be carried on, on the left bank; survey on the right bank will be carried on, only in the event of a line between the lower Congo and Manyanga being found to be impracticable, and on this subject no apprehensions are entertained.

The starting-point of the line must be on the left bank and accessible to sea-going vessels, besides it must be situated so as to allow afterwards maritime establishments to be created. This point will have to be sought for in the neighbourhood of Matadi.

The terminus of the railway must be situated beyond the rapids and cataracts in the vicinity of Leopoldville, and also at a point of the bank where establishments can be created suitable for the requirements of the Upper Congo navigation.

The general direction of the railway will thus be determinated by the geographical positions of Matadi and Leopoldville. Precise informations will first have to be obtained on the subjet, and those relating to the situation of Matadi, must be minutely verified and ascertained before the survey begins.

. . . .

In order to conduct the survey in a practical manner, the conditions under which the proposed railway can be laid must first of all be arrived at.

Means of communication for the transport of workshops, supplying for same, for transport of materials, are completely wanting. Neither roads, nor beasts of burden are to be relied upon.

Consequently, during the period of laying, the railway will have to provide for itself; hence the absolute necessity of proceeding by stages, and of pushing forward operations only as the line in the rear becomes practicable.

Hence likewise the necessity of attempting no work the completion of which would necessitate any considerable length of time; difficulties will have to be turned, however much the line will have to be lengthened accordingly.

The line must comprise no tunnels, nor trenches cut in the rock, nor auy important trenches even in soft soil, nor any considerable displacement of soil.

Constructive works must have for sole object the crossing of streams, and the protection of the line from the action of the waters during the rainy season.

It must always be remembered that whatever may be the line, the first expenses of laying will be considerable, in consequence of the length of railway compared to the results of traffic during the first years, consequently it will be necessary to diminish those expenses by every possible means even should difficulties of working issue therefrom.

No first expense must be maid with a view of diminishing the cost of working.

The railway must at first be accessible only to produce commanding a high rate of transport; later on as traffic gradually will develop, owing to the first railway laid, the line may be modified and improved; importants works may be undertaken in order to rectify and improve it, to diminish the costs of working, and to allow the tariffs to be lowered.

In order to keep within those general conditions, the line will have completely to conform to the nature of the ground, only those earthworks, which will be necessary to correct the profile must be admitted, or else along mountain-sides for the establishment of the surface of formation.

Constructive works must be provided with iron superstructures on iron piers, requiring only fitting up and little or no works of masonry, according to the nature of the soils to be met with.

The halting-places will at first be determined with the exclusive object of supplying water to the engines. Supplies of fuel will however also have to be considered as well as, under circumstances which will no doubt at first be of rare occurrence, the storage of goods for transport, especially where affluents of the Congo are to be met with, navigable for ships and for rafts.

The actual studies are only to comprise the centralisation of information respecting the tribes to be met with at certain distances from the line. The plans of buildings for stations, halts, workshops, stores, will be dealt with later on.

. . . .

The proposed railway is intended to have a rail-gauge of 75 centimetres, sufficient for the construction of relatively powerful engines, and possessing in many other ways indisputable advantages while having a capacity of traffic superior to any wants which are likely to occur.

The surface of formation will have a width of $3^{m}20$; the line will easily admit of slopes of 30 millimetres per metre.

Slopes of this incline superior in length to 1,000 metres will have to be sectioned every 100, or 150 metres.

If needs be, slopes of a superior incline to 30 millimetres can be adopted, but only exceptionally and on short distances; under these conditions slopes of 48 millimetres can be admitted, but on a maximum length of 500 metres, with horizontalnesses of from 100 to 150 meters.

Should slopes of a steeper incline be found to be in-indispensable, exceptional means of working will have to be resorted to, funicular traction, rack, etc., etc., and in this case the steepest inclines will have to be boldly adopted, in order to concentrate on the shortest possible distances these exceptional working difficulties.

The straight parts of the line will be joined by circular or parabolic curves.

The radius of these curves can descend to 50 metres on condition of the latter being established on slopes the incline of which shall not exceed 5 millimetres per metre.

The operations will include a rapid reconnoitring between Matadi and Stanley-Pool, the centralisation of all details thus acquired, and the choice of the line to be adopted for the return journey;

The return by the chosen line with plan of trajectory, and survey of sufficient details to determine the line and bevelling of the railway, necessary embankments, position and importance of bridges and aqueducts, with all the necessary details for the drawing up of the final design, position of halting-places for water-supplies and conditions of erection of same;

All details concerning nature of the soil, hardness of rocks, importance of water-courses, swelling of same, etc., etc.;

Finally experiments which should be esteemed necessary for appreciating the probable cost of works, and drawing up an estimate of same.

. . . .

The plans presenting a general view of the survey will be drawn up to the scale of 1/5,000; plans to the scale of 1/1,000 will be drawn up for the particularly difficult parts, approaches to bridges or aqueducts.

The slopes surveyed must allow of curves of level being traced dividing the trajectory once in every five metres on easy ground; in difficult ground the equidistance to be two metres, or even one metre. The zones of survey to the right and to the left will extend from 50 to 200 metres according to circumstances.

. . . .

Where water-courses have to be crossed, the ground must be most carefully surveyed, the high-water marks must be noted, the nature of the soil composing the banks and bottom must be examined, as well as the strength of current, in order to establish in the drawing-up of the lengthwise profile, the position and dimensions of constructive works, and the best mode of construction to be adopted.

The rear-guard brigade will besides be instructed to note all details, of whatsoever nature concerning the ground gone over, the water-courses, whether of a permanent or temperary nature, points to be chosen for water-supplies, in a word a descriptive memorandum, day after day, of the entire plan.

. . . .

During the preliminary reconnoitrings, as well as the survey on the return, the actual surveying operations must be completed by calculations and day by day drawn up and added to the plans.

All sketches, information concerning the nature of the soil, crossing of water-courses, and details of whatsoever nature, must be every day put in order and completed so as to be easily understood and made use of by others than those by whom the information has been acquired. They must every day be entered in a separate book.

. . . .

The director and chiefs of brigades will keep diaries, in which they will enter the principal events of the day's work, length of actual surveys, astronomical observations, atmospherie and climateric conditions, distances covered, etc., in fact anything which may allow of the general progress of the work to be estimated.

The chiefs of brigades will, whenever possible forward daily copies of their diaries to the director of survey.

The director of survey will forward to Europe copy of his own diary, and those of his subordinates, every time he will have an opportunity of doing so.

SCHEDULE N° 3.

The engineers' expeditions. — Work on the ground.

On the 8th May 1887, the first expedition of engineers left for the Congo; on the 10th June same year, a second group sailed from Antwerp; at the end of July the gangs, assembled at Matadi, were composed of one director of survey, twelve engineers and one physician.

Those, who had arrived first determined the geographical position of Matadi, made some soundings to satisfy themselves of vessels of a large draught being able to land without considerable works, and reconnoitred the environs.

From the first days of August, work begun seriously; one studey-gang walked in advance, reconnoitring the country and determining rapidly, by means of the levelling compass, the zone of the ground to be surveyed. Three gangs, each composed of three engineers followed and drew with the tacheometer the plan of the reconnoitred zone. Haoussas, negroes of the Gold-Coast, were employed as staffholders. The zone on which the operations with the tacheometer were performed, varied, according to circumstances from 50 to 200 meters on both sides of the likely axis of the way. The progress of the work, which at the very beginning of the operations was only from 300 to 500 meters per brigade and per day, on the difficult grounds of Matadi and Palaballa, soon increased to 1 or 2 kilometers, after the expedition having passed the mountainous region, and by way of exception was raised to 4 and even to 5 kilometers per day, the maximum space between the stations of the instrument being 300 meters.

The operations on the ground continued in 1887 up to December, when the studey had been carried on as far as Lukunga. The work then suffered an interruption of four months on account of the rainy season; nevertheless a special gang continued working during January and February 1888 in order to execute near Matadi the survey of an alteration made in that region to the first direction-line.

In May 1888, the staff having again their full complement, works were resumed. While the chiefs of the gangs went to reconnoitrepreviously the region which extends between the Lukunga and the Stanley-Pool, the other engineers completed the works around Matadi.

At the beginning of July, the whole staff resumed the operations with the tacheometer. On the 4th November 1888, the level was set up for the last time at the Stanley-Pool and the engineers went back to Europe.

SCHEDULE N° 4.

TYPE OF SURVEY

ON DIFFICULT GROUND

between kilometers 6 and 7 (¹)

SUMMARY :

- *A.* Calculation of earthwork.
- *B.* Removal of ground.
- *C.* Estimate of construction.
- *D.* Ground-Plot.
- *E.* Longitudinal section.
- *F.* Lateral section.

(¹) The ground-plot and the longitudinal section are given for a distance of 2,250 meters, from kilometer 6,000 to kilometer 8,250.

SCHEDULE N° 4.

A

Estimate of earthwork between the kilometers 6 and 7.

NUMBERS of HECTOMETERS.	SECTIONS.	SLOPE OF TE SOIL.	DIMENSIONS.	BANK OR DUG.	SURFACES		DISTANCES BETWEEN THE SECTIONS.	CUBES		
					partial.	mean.		partial.	TOTALS. Dug.	TOTALS. Bank.
6000	Two ditches.	0	$\frac{9.00\times0.60}{2}$	D	2.90					
						1.55	36.00	45.800		
6036	—	0	0	D	0.20				45.800	
6036			0	B	0					
						1.92	18.00	34.560		
6054		1/6	$\frac{7.20\times0.40+4.00\times1.20}{2}$	B	3.84					
						1.92	32.00	61.440		96.000
6086			0	B	0					

6086	Two ditches		0	D	0.20					
						3.09	17.00	52.530		
6103	—	1/3	$\frac{8.80\times0.40+4.60\times1.75}{2}$	D	5.98					
						9.88	7.00	69.160		
6110	—	1/2.6	$\frac{9.80\times1.40+5.60\times2.40}{2}$	D	13.78					
						11.62	10.00	116.200		
6120	—	1/2.2	$\frac{9.60\times1.20+5.40\times1.30}{2}$	D	9.47					
						5.75	30.00	172.500		
6150	One ditch	1/2.2	$\frac{1.05\times1.85}{2}$	D	2.04					
						1.07	15.00	16.050		
6165	—		0	D	0.10				426.440	
6140			0	B	0					
						0.67	10.00	6.700		
6150		1/2.2	$\frac{1.85\times1.45}{2}$	B	1.34					
						3.59	30.00	107.700		
6180		1/2.8	$\frac{7.20\times0.40+4.00\times2.20}{2}$	B	5.84					
						9.27	20.00	185.400		
6200		1/3	$\frac{8.80\times1.20+5.60\times2.65}{2}$	B	12.70					
						6.35	24.00	152.400		
6224			0	B	0					452.200
								Over.	472.240	548.200

NUMBERS of HECTOMETERS.	SECTIONS.	SLOPE OF TE SOIL.	DIMENSIONS.	BANK OR DUG.	SURFACES		DISTANCES BETWEEN THE SECTIONS.	CUBES		
									TOTALS.	
					partial.	mean.		partial.	Dug.	Bank.
							Brought forward.		472.240	548.200
6228	One ditch		0	D	0.10					
						7.40	14.00	103.600		
6242	Two ditches	1/2.8	$\frac{9.50\times1.10+5.30\times3.50}{2}$	D	14.70					
						18.04	23.00	414.920		
6265	—	1/2.6	$\frac{10.55\times2.15+6.35\times3.10}{2}$	D	21.38					
						17.53	13.00	227.890		
6278	—	1/	$\frac{9.85\times1.45+5.65\times2.25}{2}$	D	13.69					
						6.89	8.00	55.120		
6286	One ditch		0	D	0.10				801.530	
6286			0	B	0					
						6.02	9.00	54.180		
6295		1/4	$\frac{9.10\times1.35+5.90\times2.00}{2}$	B	12.04					
						6.02	9.00	54.180		
6304			0	B	0					108.360

6304	One ditch		0	D	0.10					
						4.20	16.00	67.20		
6320	Two ditches	1/3.6	$\frac{9.25\times0.85+5.05\times1.65}{2}$	D	8.30					
						7.25	35.00	253.750		
6355	One ditch	1/3.2	$\frac{3.25\times1.85}{2}$	D	6.21					
						4.57	20.00	91.400		
6375	Two ditches	1/3.6	$\frac{4.20\times1.30}{2}$	D	2.93					
						2.36	10.00	23.600		
6385	One ditch	1/3.6	$\frac{3.10\times1.10}{2}$	D	1.80					
						0.95	5.00	4.750		
6390	One ditch		0	D	0.10				440.700	
6385			0	B	0					
						6.28	15.00	94.200		
6400		1/3	$\frac{8.80\times1.20+5.60\times2.60}{2}$	B	12.56					
						7.54	40.00	301.600		
6440		1/1.6	$\frac{1.80\times2.80}{2}$	B	2.52					
						2.22	40.00	88.800		
6480		1/1.8	$\frac{1.80\times2.15}{2}$	B	1.93					
						4.20	20.00	80.400		
6500		1/1.8	$\frac{3.70\times3.50}{2}$	B	6.47					
						4.02	20.00	80.400		
6520		1/2	$\frac{1.80\times1.75}{2}$	B	1.57					
						0.78	10.00	7.800		
6530			0	B	0					656.800
								Over.	1714.470	1313.360

NUMBERS of HECTOMETERS.	SECTIONS.	SLOPE OF TE SOIL.	DIMENSIONS.	BANK OR DUG.	SURFACES		DISTANCES BETWEEN THE SECTIONS.	CUBES		
					partial.	mean.		partial.	TOTALS. Dug.	TOTALS. Bank.
							Brought forward.		1714.170	1313.360
6426	One ditch		0	D	0.10					
						0.86	14 00	12.040		
6440	—	1/1.6	$\frac{1.60 \times 1.90}{2}$	D	1.62					
						1.52	40.00	60.800		
6480	—	1/1.8	$\frac{1.40 \times 1.90}{2}$	D	1.43					
						0.95	20.00	19.000		
6500	—	1/1.8	$\frac{0.75 \times 1.00}{2}$	D	0.47					
						0.88	20.00	17.000		
6520	—	1/2	$\frac{1.25 \times 1.90}{2}$	D	1.29					
						8.56	30.00	256.800		
6550	Two ditches	1/2	$\frac{9.05 \times 0.75 + 4.95 \times 4.95}{2}$	D	15.84					
						7.97	12.00	95.640		
6562	One ditch		0	D	0.10				461.880	
						9.63	20.00	192.600		
6562			0	B	0					
6582		1/2.4	$\frac{9.10 \times 1.35 + 5.90 \times 4.45}{2}$	B	19.27					
								59.040		

6598		1/2.8	13.17× [illegible]							
						118.24	10.00	1182.400		
6608		1/10.4	$\frac{27.30\times10.45+24.10\times2.55}{2}$	B	173.37					
						128.48	8.00	1027.840		
6616		0	$\frac{22.00\times7.60}{2}$	B	83.60					
						50.92	12.00	64 040		
6628		1/8	$\frac{11.20\times2.40+8.00\times1.20}{2}$	B	18.24					
						9.12	10.00	91.200		
6638			0	B	0					3764.120
6638	One ditch		0	D	0.10					
						4.06	12.00	48.720		
6650	Two ditches	1/5	$\frac{9.40\times1.00+5.20\times1.20}{2}$	D	8.02					
						12.70	10.00	127.000		
6660	—	1/5	$\frac{10.70\times2.30+6.50\times1.50}{2}$	D	17.38					
						29.31	20.00	586.200		
6680	—	1/8	$\frac{13.70\times5.30+9.50\times1.00}{2}$	D	41.25					
						42.90	10.00	429.000		
6690	—	1/8	$\frac{13.95\times5.45+9.75\times1.30}{2}$	D	44.55					
						41.26	15 00	618.900		
6705	—	1/6	$\frac{12.90\times4.50+8.70\times1.55}{2}$	D	37.97					
						29.55	7.00	206.850		
6722	—	1/5.4	$\frac{11.20\times2.80+7.00\times1.50}{2}$	D	21.13					
						17.78	10.00	177.800		
								Over.	2176.350	5077.430

NUMBERS of HECTOMETERS.	SECTIONS.	SLOPE OF TE SOIL.	DIMENSIONS.	BANK OR DUG.	SURFACES		DISTANCES BETWEEN THE SECTIONS.	CUBES		
					partial.	mean.		partial.	TOTALS. Dug.	TOTALS. Bank.
							Brought forward.		2176.350	5077.480
6732	Two ditches	1/5	$\frac{10.25 \times 1.95 + 6.05 \times 1.40}{2}$	D	14.43					
						7.26	16.00	116.160		
6748	One ditch		0	D	0.10				2310.630	
6748			0	B	0					
						2.59	7.00	18.130		
6755		1/4	$\frac{7.50 \times 0.55 + 4.30 \times 1.45}{2}$	B	5.18					
						30.98	15.00	464.700		
6770		1/9.6	$\frac{17.00 \times 5.30 + 13.80 \times 1.70}{2}$	B	56.78					
						31.23	10.00	312.300		
6780		1/3	$\frac{7.40 \times 0.40 + 4.20 \times 2.00}{2}$	B	5.68					
						2.84	5.00	14.200		
6785			0	B	0					809.330
6785	One ditch		0	D	0.10					
						9.99	15.00	149.850		
6800	Two ditches	1/2.2	$\frac{10.20 \times 1.80 + 6.00 \times 3.50}{2}$	D	19.88					
						24.06	40.00	962.400		

6840	—	1/3	$\frac{11.5}{2}$							
						25.35	34.00	1014.000		
6874	—	1/2.2	$\frac{10.45\times2.05+6.25\times3.70}{2}$	D	22.47					
						11.28	30.00	338.400		
6904	One ditch		0	D	0.10				2464.650	
6904			0	B	0					
						2.62	11.00	28.820		
6915		1/3.4	$\frac{7.20\times0.40+4.00\times1.90}{2}$	B	5.24					
						4.22	15.00	63.300		
6930		1/3.6	$\frac{3.20\times2.00}{2}$	B	3.20					
						1.60	3.00	4.800		
6933			0	B	0					96.920
6930	One ditch		0	D	0.10					
						3.88	10.00	38.800		
6940	Two ditches	1/4	$\frac{9.25\times0.85+5.05\times1.40}{2}$	D	7.67					
						10.31	20.00	206.200		
6960	—	1/4.4	$\frac{10.04\times1.64+5.84\times1.55}{2}$	D	12.96					
						14.92	40.00	596.800		
7000	—	1/3.2	$\frac{10.20\times1.80+6.00\times2.50}{2}$	D	16.88				841.800	
								Totals.	7793.430	5983.730

SCHEDULE N° 4.

B

Removal of ground, from kilometer 6 to kilometer 7.

Cumulated distances.	Mean distance.	DESCRIPTION of WORK.		Distance of transport.	DESCRIPTION of GROUND.	PRICE PER CUBIC METER OF DIGGING.	CUBE of EARTHWORK.	COST		REMARKS.
		Bank.	Dug.					of digging.	of transport.	
						Fr.		Fr.	Fr.	
from 6000 to 6036	6018		D		Clay with erratic blocks.	3 00	45.800	137 40		To be removed to the next bank.
				43^{m}						
from 6036 to 6086	6061	B			Id.	3 00	96 000 — 10 °/. 9.600 86.400		19 69 26 39	45.800 from the preceding dug. 40.600 — next — 86.400
				65^{m}						
from 6086 to 6165	6126		D		Id.	3 00	426.440	1,279 32		40.600 to be removed to the preceding bank. 385 840 — — — next — 426.440
				56^{m}						
from 6140 to 6224	6182	B			Id.	3 00	452.200 — 10 °/. 45.220 406.980		216 07	385.840 from the preceding dug. 21.140 — next — 406.980
				75^{m}						
from 6228 to 6286	6257		D		Id.	3 00	801.500	2,404 50		21.140 to be removed to the preceding bank. 97.524 — — — next — 682.836 spoil. 801.500
				38^{m}						
from 6286 to 6304	6295	B			Id.	3 00	108.360 — 10 °/. 10.836 97.524		37 06	From the preceding dug.

from 6304 to 6390	6347									to the next bank.
from 6385 to 6530	6457	B		110m	Id.	3 00	656.800 — 10 °/₀ 65.680 591.120		484 77 55 66	440.700 from the preceding dug. 150.420 — next — 591.120
from 6426 to 6562	6494		D	37m	Id.	3 00	461.880	1,385 64		150.420 to be removed to the preceding bank. 311.460 — — — next — 461.880
from 6562 to 6638	6600	B		610m	Id.	3 00	3.764.120 —10°/₀ 376.412 3.387.708	2,206 85	330 15 2,148 89	311.460 from the preceding dug. 765.618 by borrow. 2.310.630 from the next dug. 3.387.708
from 6638 to 6748	6693		D	93m	Id.	3 00	2.310.630	6,931 89		To be removed to the preceding bank.
from 6748 to 6785	6766	B		73m	Id.	3 00	809.330 — 10 °/₀ 80.933 728 397		575 43	From the next dug.
from 6785 to 6904	6845		D	79m	Id.	3 00	2.464 650	7,393 95		728 397 to be removed to the preceding bank. 1.736.253 spoil. 2.464.650
from 6904 to 6933	6918			73m	Id.	3 00	96.920 — 10 °/₀ 9.692 87.228		41 00	From the next dug.
from 6930 to 7000	6965			47m	Id.	3 00	841.800	2,525 40		87.228 to be removed to the preceding bank. 754.572 spoil. 841.800
								25,677 05 29,612 16	3,935 11	

SCHEDULE N° 4.

C

Estimate of construction of the line between kilometers 6 and 7.

DESCRIPTION OF THE WORKS.	UNIT of MEASURE.	Quantities.	PRICE of UNIT.	PRODUCTS PARTIAL.	PRODUCTS BY CATEGORY OF EXPENSES.
Congo-Railway. — Section : Matadi-Palaballa.					
Recapitulation of expenses from kilometer 6 to kilometer 7.					
1° Earthwork	»	»	»	»	29612 16
2° Bridge of $10^{m}00$ width over the Leopold-pass, at the cumulation 6770.					
Digging . . . . $2 \times 5.00 \times 18.00 \times 1.00$	m³	180.00	5 00	900 00	»
Masonry :					
Foundations . . . . $2 \times 3.20 \times 4.50 \times 1.00 = 28.80$					
Id. . . . . $4 \times \frac{4.50+1.50}{2} \times 7.00 \times 1.00 = 84.00$					
Abutments . . . . $2 \times 3.20 \times 7.00 \times 2.50 = 112.00$					
Wing-walls . . . . $4 \times \frac{7.00 \times 7.00}{2} \times 1.00 = 98.00$					

2 3	m³	420.80	38 00	15990 40	
Metallic superstructure (700 kilogr. per lineal meter) . . .	t.	7.7	1100 00	8470 00	
Contingencies.	»	»	»	1239 60	
					26600 00
3° Culvert of 3m00 width with superstructure of old rails (weighing 37 kilograms) at the cumulation 6608.					
Digging. . . . . 30×6.00×0.50	m³	90	5 00	450 00	
Masonry :					
Foundations . . . . 28.00×5.50×0.50= 77.00					
Abutments . . . . 2×27.50×2.00×1.00=110.00					
	m³	187.00	38 00	7106 00	
Superstructure of old rails . . . . . 27.50×4.00×0.30	t.	33.00	120 00	3960 00	
Beton. . . . . 27.50×4.00×0.20	m³	22.00	60 00	1320 00	
Contingencies.	»	»	»	564 00	
					13400 00
				»	
			Over.		69612 16

DESCRIPTION OF THE WORKS.		UNIT of MEASURE.	Quantities.	PRICE of UNIT.	PRODUCTS	
					PARTIAL.	BY CATEGORY OF EXPENSES.
				Brought forward.		69612 16
4° Aqueduct of 1^m20 at cumulation 6295.						
	Beton pipes. . .	l. m.	8 00	110 00	880 00	
	Built head . . .	p.	1	212 00	212 00	
						1092 00
5° Aqueduct of 0.60 at cumulation 6180.						
	Beton pipes. . .	l. m.	7.00	46 00	322 00	
	Built head . . .	p.	1	134 00	134 00	
						456 00
6° Aqueduct of 0.60 at cumulation 6355.						
	Beton pipes. . .	l. m.	8 00	46 00	368 00	
	Built head . . .	p.	1	134 00	134 00	
						502 00

Beton pipes. . .	l. m.	9 00	46 00	414 00	
Built head . . .	p.	1	134 00	134 00	
					548 00
8° Aqueduct of 0.60 at cumulation 6915.					
Beton pipes. . .	l. m.	6.00	46 00	276 00	
Built head . . .	p.	1	134 00	134 00	
					410 00
9° Ten tubes of 0.30 on an average $8^{m}00$ long.					
Beton pipes. . .	l. m.	80.00	15 00	1200 00	
Ten built heads .	p.	10	34 00	340 00	
					1540 00
10° Way	l. m.	1000	18 50		18500 00
				Total.	92660 16

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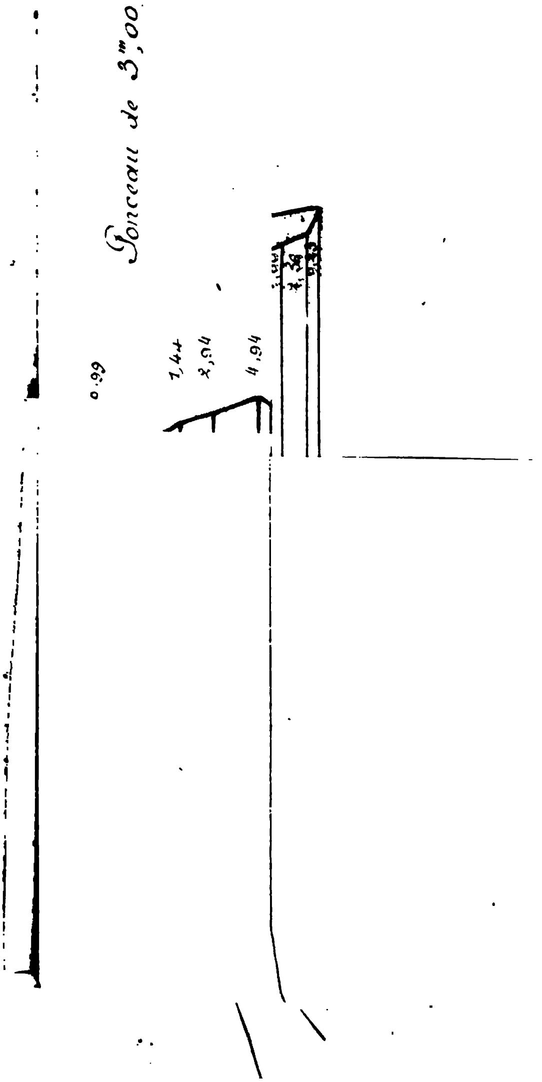

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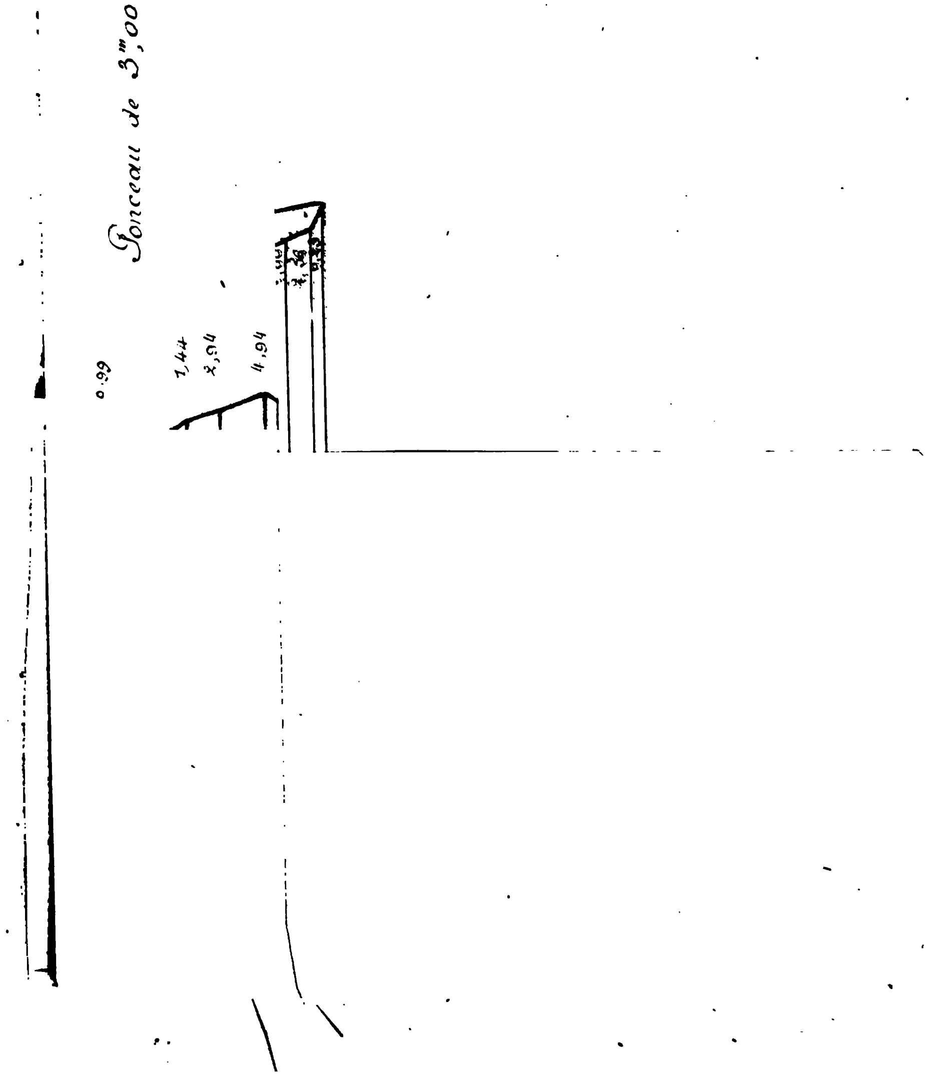

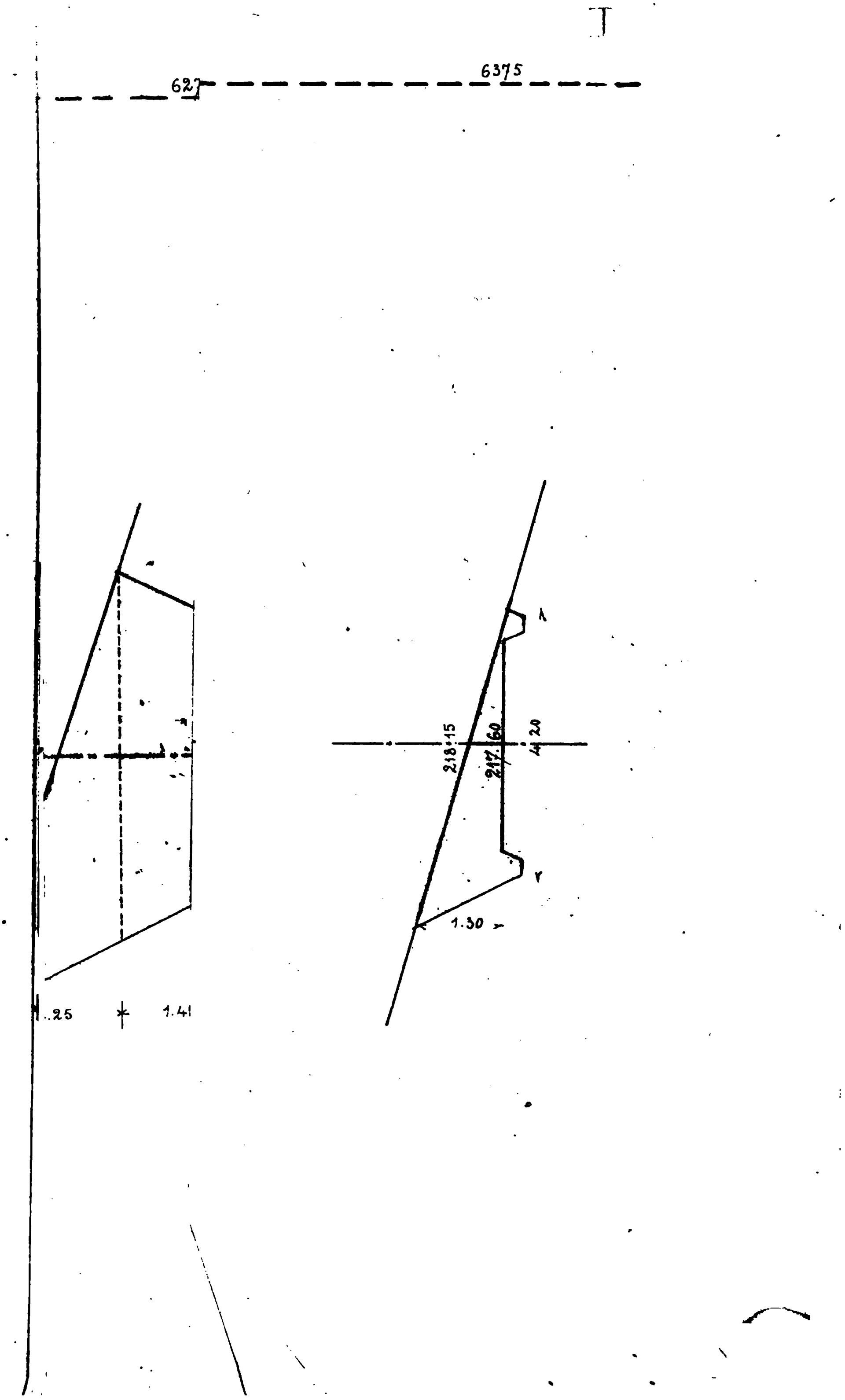
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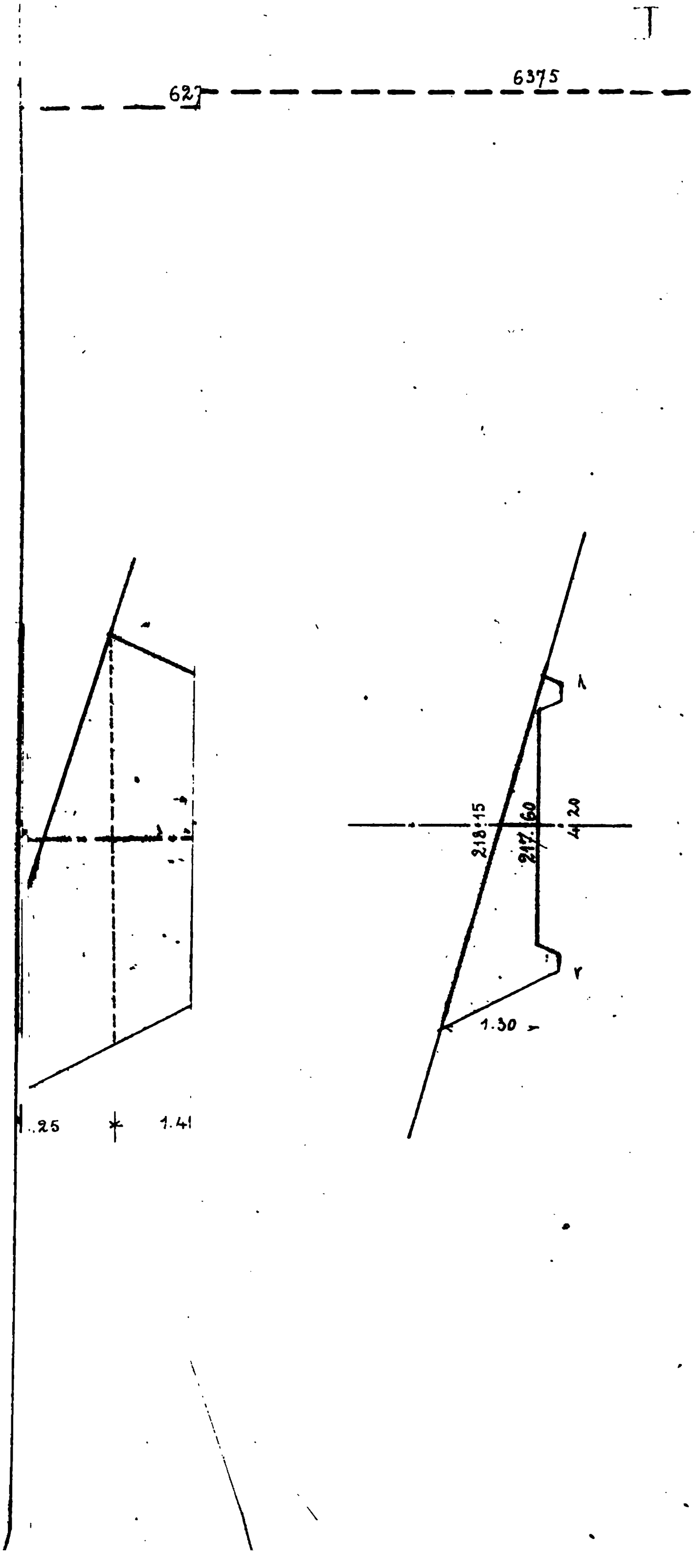
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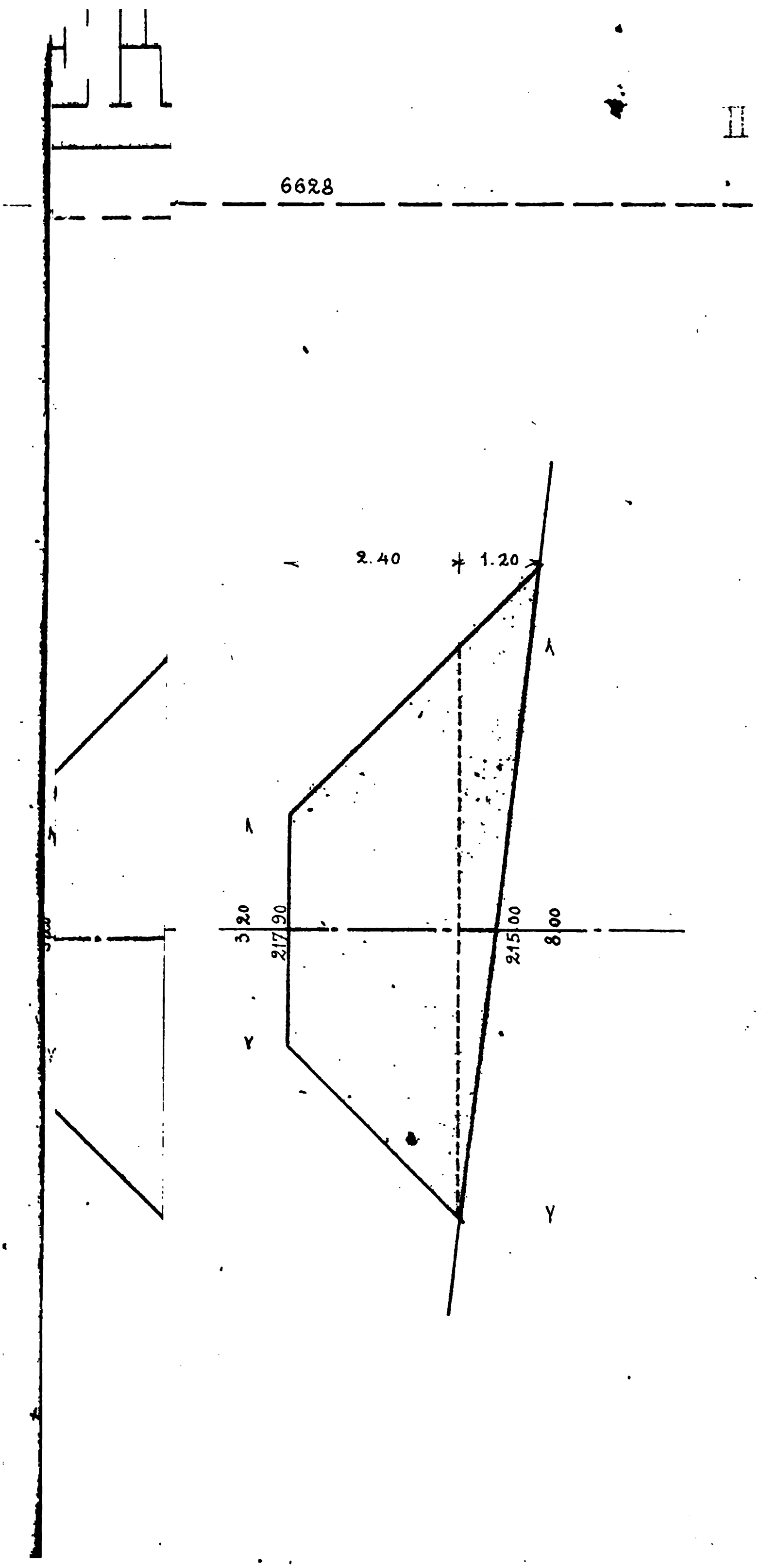
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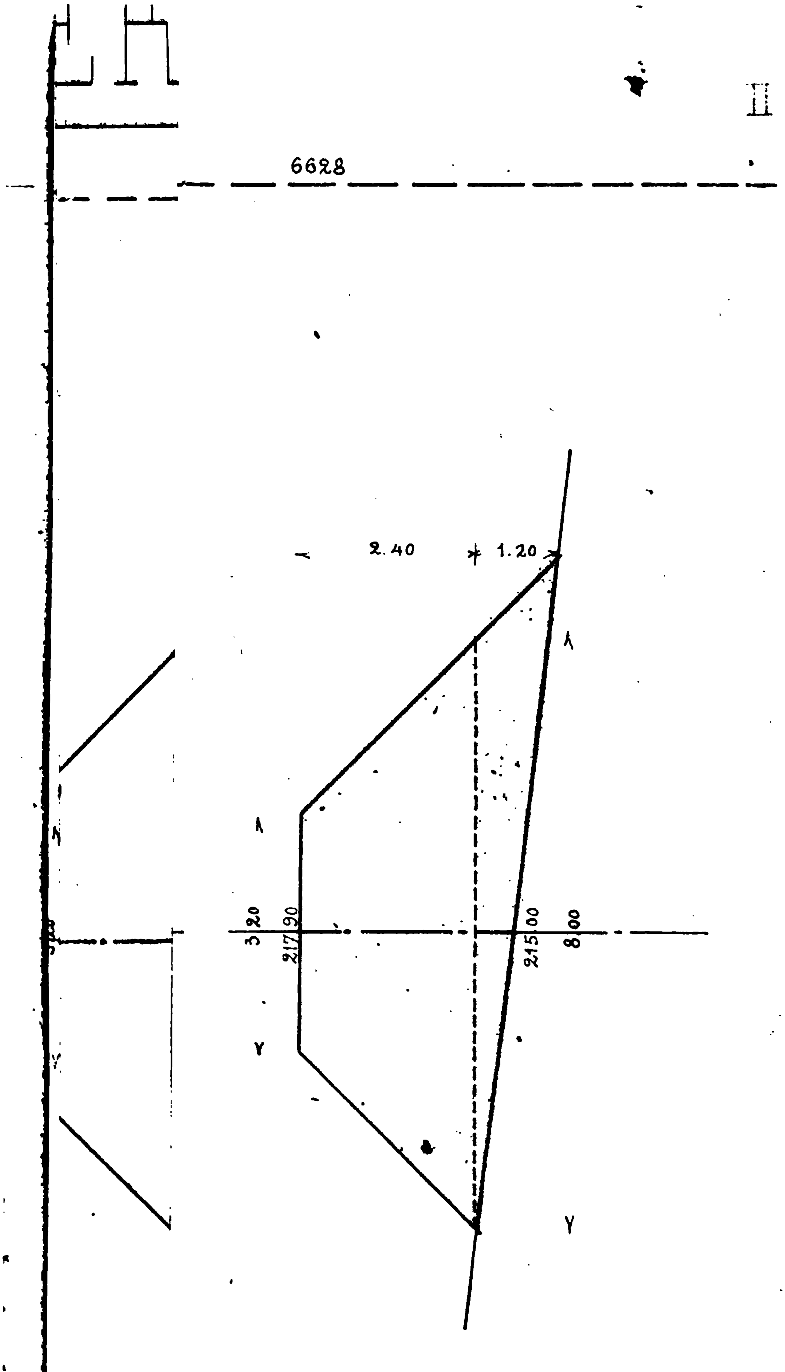
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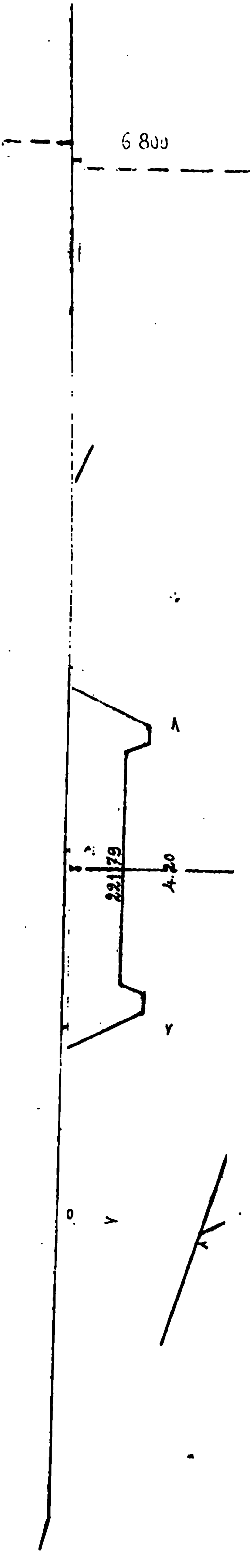
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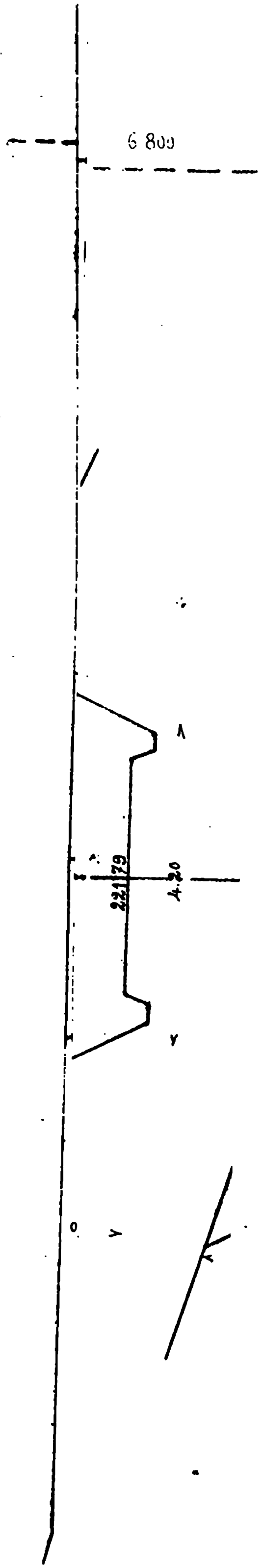
6 800
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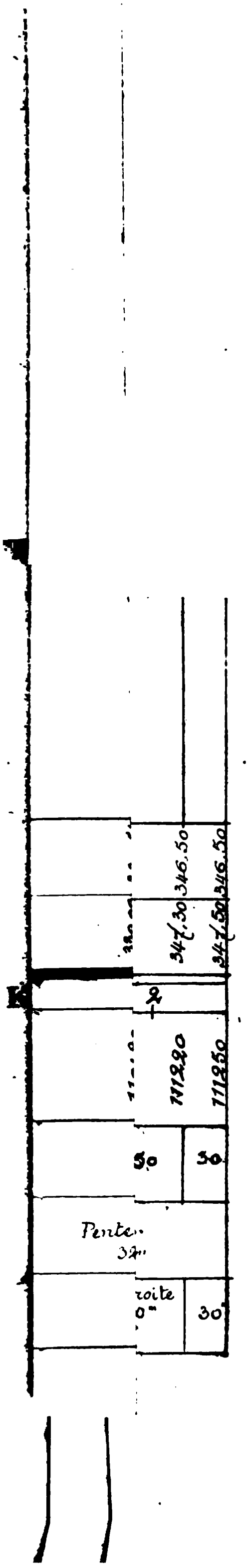
SCHEDULE N° 5.

C

Estimate of construction from kilometer 109 to kilometer 110.

DESCRIPTION OF THE WORKS.	UNIT of MEASURE.	Quantities	PRICE of UNIT.	PRODUCTS	
				PARTIAL.	BY CATEGORY OF EXPENSES.
1° Earthwork	„	„	„	„	3,977 64
2° Aqueduct of $0^{m}60$ width at cumulation 109151.					
Beton pipes. . .	1 m.	7.00	48 00	336 00	
Built head. . .	p.	1	176 00	176 00	512 00
3° Aqueduct of $0^{m}60$ width at cumulation 109806.					
Beton pipes. . .	1. m.	7.00	48 00	336 00	
Build head. . .	p.	1	176 00	176 00	512 00
4° Three tubes of $0^{m}30$ diameter on an average $4^{m}00$ long.					
Beton pipes. . .	1. m.	12.00	16 50	198 00	
Three built heads . .	p.	3	44 50	133 50	331 50
5° Way.	1 m.	1000.00	21 50		21,500 00



Plan de comparaison à 150m.
au-dessus du niveau de la mer
Cotes du projet

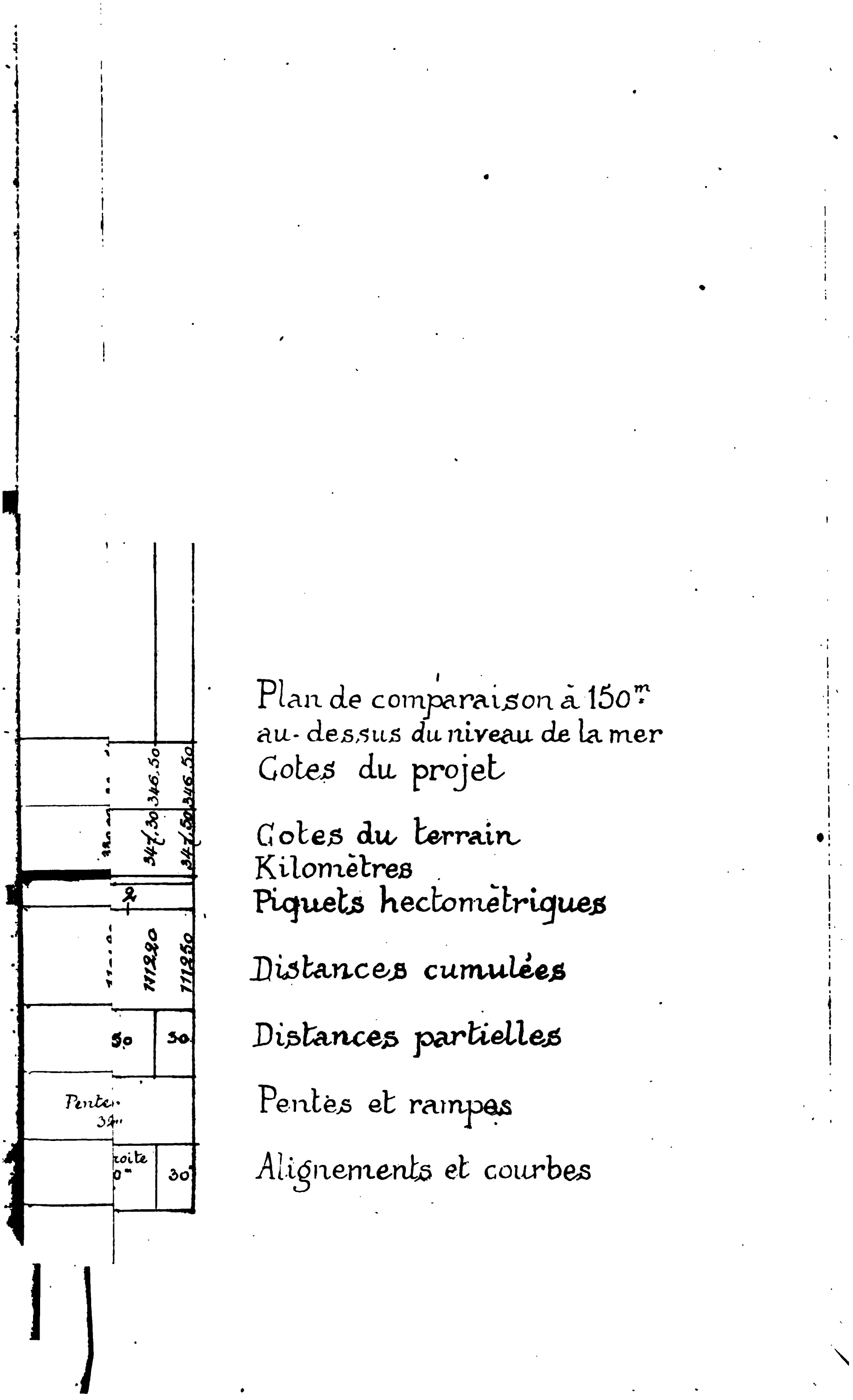
Cotes du terrain
Kilomètres
Piquets hectométriques

Distances cumulées

Distances partielles

Pentes et rampes

Alignements et courbes


Plan de comparaison à 150m au-dessus du niveau de la mer
Cotes du projet
Cotes du terrain
Kilomètres
Piquets hectométriques
Distances cumulées
Distances partielles
Pentes et rampes
Alignements et courbes
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346.50
347.30
347.50
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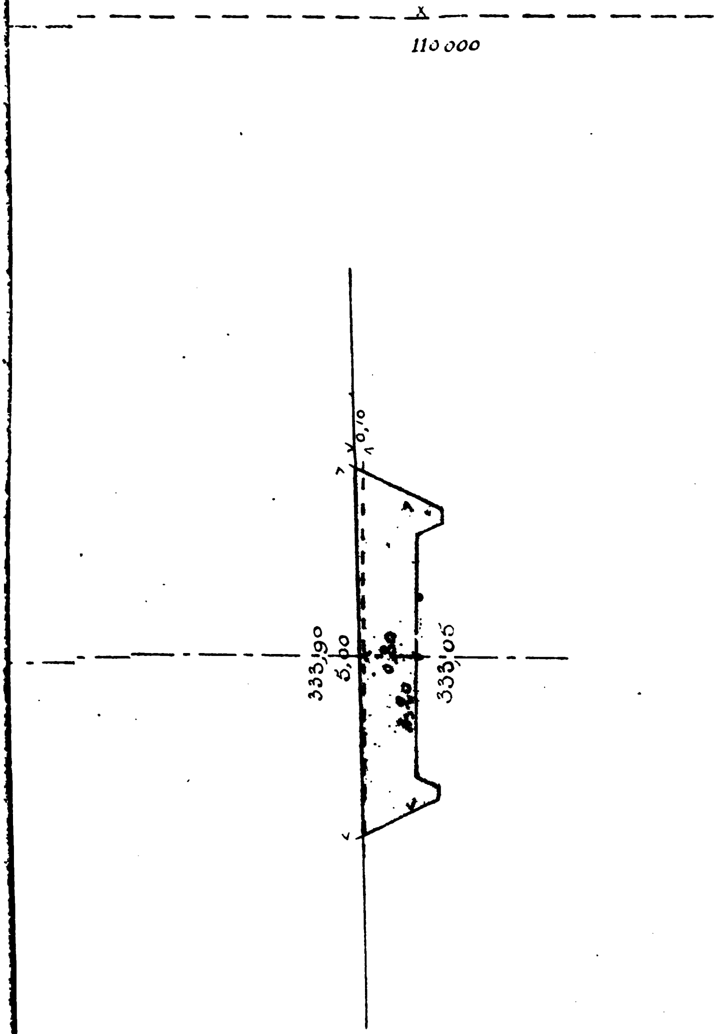
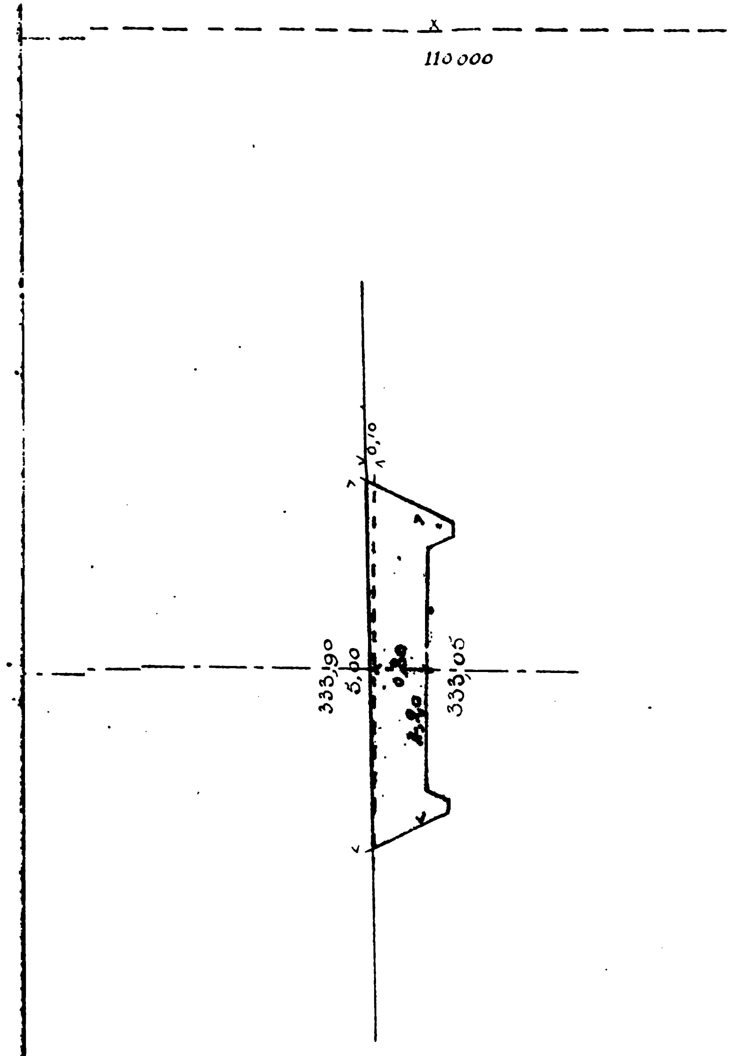

110 000
0,10
333,90
5,00
0,20
3,40
333,05

SCHEDULE N° 5.

C

Estimate of construction from kilometer 109 to kilometer 110.

DESCRIPTION OF THE WORKS.	UNIT of MEASURE.	Quantities	PRICE of UNIT.	PRODUCTS	
				PARTIAL.	BY CATEGORY OF EXPENSES.
1° Earthwork	"	"	"	"	3,977 64
2° Aqueduct of 0m60 width at cumulation 109151.					
Beton pipes.	1 m.	7.00	48 00	336 00	
Built head.	p.	1	176 00	176 00	512 00
3° Aqueduct of 0m60 width at cumulation 109806.					
Beton pipes.	1. m.	7.00	48 00	336 00	
Build head.	p.	1	176 00	176 00	512 00
4° Three tubes of 0m30 diameter on an average 4m00 long.					
Beton pipes.	1. m.	12.00	16 50	198 00	
Three built heads	p.	3	44 50	133 50	331 50
5° Way	1 m	1000 00	21 50		21 500 00


x
110 000
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333,90
5,00
0,20
1,50
333,05

SCHEDULE N° 6.

Estimate of expenses of construction.

1t *Section :* from kilometer 0 to kilometer 26.

Earthworks	1,501,272.36		
(Digging : 189,093 c. m.)			
Bridges and culverts with iron superstructure . .	268,200.00		
Culverts with superstructure of spare-rails . .	25,650.00		
Aqueducts of pressed beton.	120,104.00		
Retaining-walls	236,773.64		
Way, ballasting and laying.	481,000.00		
	»	2,633,000.00	
Total of expenses during the first year of construction		»	2,633,000.00

2d *Section :* from kilometer 26 to kilometer 46.

Earthworks	155,530.73		
(Digging . 37,405 c. m.)			
Bridges and culverts with iron superstructure . .	81,000.00		
Culverts with superstructure of spare-rails . .	21,150.00		
Aqueducts of pressed beton.	47,485.00		
Retaining-walls	3,450.00		
Way, ballasting and laying.	380,000.00		
	»	688,615.73	

3d *Section :* from kilometer 46 to kilometer 86.

Earthworks	206,199.74		
(Digging : 75,776 c. m.)			
Bridges and culverts with iron superstructure . .	153,750.00		
Culverts with superstructure of spare-rails . .	14,000.00		
Aqueducts of pressed beton.	61,366.00		
Way, ballasting and laying.	827,085.00		
	»	1,262,400.74	
	Over. .	1,951,016.47	

Brought forward. .		1,951,016.47	

4th *Section* : from kilometer 86 to kilometer 126.

Earthworks . . . . . (Digging : 59,295 c. m.)	115,216.63		
Bridges and culverts with iron superstructure . .	140,550.00		
Culverts with superstructure of spare-rails . .	12,100.00		
Aqueducts of pressed beton.	50,339.50		
Way, ballasting and laying.	873,222.50		
	»	1,191,428.63	

5th *Section* : from kilometer 126 to kilometer 166.

Earthworks . . . . . (Digging : 59,745 c. m.)	151,454.90		
Bridges and culverts with iron superstructure . .	200,800.00		
Culverts with superstructure of spare-rails . .	17,2 0.00		
Aqueducts of pressed beton.	53,500.00		
Way, ballasting and laying.	868,600.00		
	»	1,291,554.90	
Total of expenses during the second year of construction		»	4,434,000.00

6th *Section* : from kilometer 166 to kilometer 211.

Earthworks . . . . . (Digging : 68,247 c. m.)	206,150.00		
Bridges and culverts with iron superstructure . .	201,360.00		
Culverts with superstructure of spare-rails . .	65,215.00		
Aqueducts of pressed beton.	31,950.00		
Way, ballasting and laying.	956,250.00		
	»	1,460,925.00	
Over. .		1,460,925 »	

Brought forward. .		1,460,925.00	
7th *Section :* from kilometer 211 to kilometer 256.			
Earthworks . . . . . (Digging : 70,341 c. m.)	217,124.00		
Bridges and culverts with iron superstructure . .	314,476.00		
Bridges with superstructure of spare-rails	20,350.00		
Aqueducts of pressed beton.	60,150.00		
Way, ballasting and laying.	960,750.00		
	»	1,572,850.00	
8th *Section :* from kilometer 256 to kilometer 301.			
Earthworks . . . . . (Digging : 71,220 c. m.)	224,100.00		
Bridges and culverts with iron superstructure . .	383,500.00		
Culverts with superstructure of spare-rails. . .	28,590.00		
Aqueducts of pressed beton.	78,160.00		
Way, ballasting and laying.	975,375.00		
	»	1,689,725.00	
Total of expenses during the third year of construction		»	4,723,500.00
9th *Section :* from kilometer 301 to kilometer 346.			
Earthworks . . . . . (Digging : 69,125 c. m.)	212,120.00		
Bridges and culverts with iron superstructure . .	409,470.00		
Culverts with superstructure of spare-rails. . .	42,450.00		
Aqueducts of pressed beton.	103,010.00		
Way, ballasting and laying.	979,650.00		
	»	1,746,700.00	
Over. .		1,746,700.00	

Brought forward. . 1,746,700.00

10th *Section :* from kilometer 346 to kilometer 391.

Earthworks	206,450.00	
(Digging : 67,925 c. m.)		
Bridges and culverts with iron superstructure . .	213,160.00	
Culverts with superstructure of spare-rails. . .	32,135.00	
Aqueducts of pressed beton.	72,055.00	
Way, ballasting and laying.	994,500.00	
	»	1,518,300.00

11th *Section :* from kilometer 391 to kilometer 435.

Earthworks	217,830.00	
(Digging : 72,108 c. m.)		
Bridges and culverts with iron superstructure . .	198,277.00	
Culverts with superstructure of spare-rails. . .	34,430.00	
Aqueducts of pressed beton.	75,513.00	
Way, ballasting and laying.	999,000.00	
	»	1,525,050.00

Total of expenses during the fourth year of construction . . . . » 4,790,050.00

Recapitulation.

1st year	Fr.	2,633,000.00
2d —		4,434,000.00
3d —		4,723,500.00
4th —		4,790,050.00
Total of expenses of construction.		16,580,550.00

SCHEDULE N° 7.

Several notes on the prices adopted in the estimates

A

Note on the determination of the price for earthworks.

The carting of earth in the earthwork has been limited to 200 meters. The price of conveyance has been fixed at 5 francs per kilometer and ton (or 10 francs per cubic meter).

This price is fr. 1.50 higher than that determinated for the conveyance, by trollies, of the way and constructive works, in order to take into account the frequency of loading and unloading.

The nature of the grounds crossed by the way has been determinated according to the reports of the engineers who have surveyed the country.

The grounds have been classed in three principal categories :

1° Compact clay;

2° Very compact gravel stuffed with rocks;

3° Hard rocks (psammite, quartz, quartzites, etc.).

The cost price per cubic meter of digging the grounds of the first category has been fixed at fr. 1.50 according to a work executed at Boma under the direction of M. Rezette, engineer.

This price is the same as that paid for the earthworks of the railway from Saint-Paul de Loanda to Ambacca (province of Angola).

The determination of the cost price of the rock-working (3ᵈ category), has been founded on the experiments made at Kaiserbraun (Austria) as well as on the informations supplied by the belgian engineers for bridges and roads, taking into account the superior value of workmanship in Africa.

The price of 10 francs stipulated per cubic meter of rock-cutting is to be decomposed as follows :

Boring (manual labour)	fr.	7 50
Explosives		1 15
Matches and caps		0 86
Implements and contingencies		0 49
	fr.	10 00

Applying the same principles to search the price per cubic meter of compact gravel-digging, one finds 4 francs.

As the several categories of grounds to be met with are only combinations of the three categories as above, the cost price par cubic meter of digging will be as follows :

In compact clay	fr.	1 50
In clay, stuffed with 1/5 of erratic quartz-rocks		3 00
In compact gravel		4 00
In gravel stuffed with 1,5 of rocks		5 10
— — 1/3 —		6 75
— — 2/3 -		8 37
In solid rock		10 00

B

Note on the determination of the price of conveyance on the line.

I. — Conveyance will be effectuated by locomotives and by trollies pushed by negroes. On the last portion being about 3 kilometers long, the materials required for the constructive works will be conveyed by means of a portable way established on a provisional surface of formation being 1 meter broad; on the preceding portion, the surface of formation assumes its norma section and the conveyance of materials is to be effectuaded by locomotive on the definitive way.

Supposing 300 meters of way were to be laid per day, the materials of the way properly so called will be conveyed by trollies to a distance of 150 meters, while those destined to the constructive works will be conveyed to an average distance of 1,500 meters.

II. — By experiments made at Boma, it has been proved that a gang of forty negroes is able to effectuate in one day the unloading of 100 tons, encluding the conveyance to a distance of 250 meters and storing.

Consequently the work of a negro is equal to

$$\frac{100 \times 0.250}{40} = 0.625 \text{ T. K.}$$

Reducing this figure to 0.500, two day's work of a negro would be required (salary, fr. 1.25) or an expense of fr. 2.50 to produce 1 kilometer-ton.

III. — As long as the distance between Matadi and the constructed extremity of the line will be such that a locomotive may be able to effectuate the two journeys in one day, the materials may continue to be stored at Matadi. As the distance will become greater, it will be preferable to establish a depot on he line, to which all materials will be conveyed by regular train, to be removed afterwadrs and conveyed to the working-places.

Such is the consideration by which we have been induced to divide the line into sections of an average length of from 40 to 45 kilometers.

Up to the kilometer 46 transports may be effectuated from the depot to be kept at Matadi; up to that point, the section is very diversified. Engines weighing 30 useful tons would scarely be able to d rag more than a load of 25, and as our anticipations concerning the progress of the works suppose a setting to work of about 50 tons for one day's work, it will be necessary to divide into two all the trains on the first 46 kilometers. Beyond the kilometer 46, the section of the way will allow the useful load of a train to be raised to 50 tons.

IV. — As the works will advance, the working-stock will become more considerable.

The following are the anticipations per section :

1st section,	from kil.	0	to kil.	26	3	locomotives,	15	carriages.
2d	—	26	—	46	5	—	40	—
3d	—	46	—	86	7	—	65	—
4th	—	86	—	126	7	—	75	—
5th	—	126	—	166	7	—	75	—
6th	—	166	—	211	9	—	100	—
7th	—	211	—	256	9	—	100	—
8th	—	256	—	301	12	—	120	—
9th	—	301	—	346	12	—	120	—
10th	—	346	—	391	15	—	150	—
11th	—	391	—	435	15	—	150	—

V. — The stock required for the conveyance by trollies will be the same for the whole duration of the works, as such conveyance does not depend on the place where they are effectuated.

This special stock will be composed of 3 kilometers of portable way and 25 trollies.

VI. — *Analysis of the cost price.* — The cost price has been determinated for each section. For example, the cost price for the 4th section, from the kilometer 86 to the kilometer 126 (from La Lafu to La Luima) has been established as follows :

A. — *Conveyance by locomotives.* — From the beginning of the section, the spoil will be established at the kilometer 86.

To convey 50 tons per day, two trains are to be disposed per day (or one train with double power), between Matadi and Massa Mankouge (at the kilometer 46) and one train between the said point and La Lufu (kilometer 86).

Under such circumstances about three months would be necessary to effectuate the whole transport.

The service will be secured, with a sufficient stock of reserve, by providing five locomotives and fifty waggons.

As for the conveyance on the section in way of being constructed, it would require a stock of two locomotives and fifteen waggons. The average distance to be run would be about 20 kilometers.

The expenses for three months are to be decomposed as follows :

7 locomotives. . . . . fr.	210,000
65 waggons.	162,500
Total. . fr.	372,500

Depreciation at the rate of 5 p. c. for 3 months. . . . . fr.	18,625	
Permanent staff : 7 engine-drivers .	16,000	
» » 7 stokers . . .	4,500	
Auxiliary staff, two companies of 40 men	9,000	
Fuel	14,500	
Grease, oil and sundries	4,875	
	»	67,500

B. — *For the conveyance by trollies we find :*

Depreciation of the stock (value 15,000 francs) at the rate of 10 p. c. . . . . fr.	1,500	
Successive conveyance of the materials of the temporary way	5,500	
Conveyance of materials for the constructive works : 1,500 tons × 1.5 k. × 2.50	5,625	
Conveyance of materials for the permanent way : 3,000 × 0.15 × 2.50.	1,125	
Sundries and contingencies	1,350	
	»	15,100
	Total. . fr.	82,600

The number of tons to be conveyed being 4,500, the expense per ton will be $\frac{82,600}{4,500}$ = fr. 18.40.

VII. — Applying the same process to each of the eleven sections of the line, one will find the following results:

1st	section, from kil.	0	to kil.	26,	price of transport	per ton.	11.35
2d	—	26	—	46,	—	—	14.50
3d	—	46	—	86,	—	—	16.80
4th	—	86	—	126,	—	—	18.40
5th	—	126	—	166,	—	—	19.40
6th	—	166	—	211,	—	—	22.00
7th	—	211	—	256,	—	—	23.40
8th	—	256	—	301,	—	—	27.80
9th	—	301	—	346,	—	—	29.00
10th	—	346	—	391,	—	—	33.40
11th	—	391	—	435,	—	—	34.60

C

Determination of the cost price per cubic meter of rubble-stone-masonry.

(Section Lufu-Luima, from kil. 86 to kil. 126.)

I. *Lime.* — Cost of lime at Antwerp (1) per ton	25 46
Conveyance from Antwerp to Matadi	32 00
Unloading at Matadi	1 00
One ton of lime at Matadi	58 46

The specific weight of lime being 0.80, the cubic meter of lime will cost 46 77

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(1) In fact the lime will be produced on the spot, lime-stone being very common in the Luima-countries. As the prices for all masonries of the way are calculated as if the whole of lime were to come from Antwerp, there will be serious savings on this account.

II. *Sand.* — The sand is to be taken in the Congo at Matadi; one cubic meter of sand is charged for	2 00

III. *Mortar.* — The mortar is composed as follows: $0^{m3}55$ of lime + $1^{m3}00$ of sand = $1^{m3}00$ of mortar, so that the cost will be : fr. 26.82 + fr. 2 =

28.82 . . . . fr.	28 82	
Tempering, 2 mason's men per cubic meter.	2 50	
Conveyance to the working-place . .	1 25	
		32 57
The lime and the sand required for 1 cubic metre of mortar weigh 2^t145; so the conveyance on the line, at the rate of 18.40 per ton, would cost		39 47
		72 04

IV. *Masonry.* — One cubic meter of rubble-stone-masonry requires $1^{m3}25$ of rubble-stone and $0^{m3}36$ of mortar.

The rubble-stones are taken from the rocks, coming from the line-cutting; they are charged, including carriage to the working-place, at 12 francs per cubic meter; the *manual labour* is charged at the rate of 7 francs per cubic meter; in fact, one may admit that a black mason (salary 4 francs) assisted by two men (salary fr. 1.50) will execute 1 cubic meter of masonry per day.

V. The *cost-price* decomposes as follows :

Rubble-stone : $1^{m3}25$ at 12 francs . . . fr.	15 00
Mortar : $0^{m3}36$ at fr. 72.04.	25 93
Manual labour.	7 00
Contingencies	3 07
Fr.	51 00

D

Analysis of the cost-price of the way on the 4th *section.*
(From kilometer 86 to kilometer 126.)

Cost of the metal: Steel-rails with accessories, weighing $21^{k}5$ per meter length and steel sleepers, weighing 23 kilos each, on board at Antwerp :

Per ton . . . . fr.	140.00	
Freight from Antwerp to Matadi .	32.00	
Unloading at Matadi	1.00	
Conveyance on the line.	18.40	
Contingencies	1.60	
Fr. . .		193.00

Weight of the metal, for 9 meters way rails, 18 meters

at $21^{k}5$. . . . . fr.	387.00	
Fish-plates, 4 pieces at $3^{k}25$ . . .	14.00	
Bolts, 8 at $0^{k}45$	3.60	
12 sleepers at $23^{k}00$	276.00	
Fr. . .		679.60
Weight per meter length.		$75^{k}51$

Cost-price : Metal, 0.07551 ton at 193 . . fr.	14.57
Laying, per meter length at 1.50	1.50
Ballast, value, 0.51 cubic meter at 5 . . .	2.55
— conveyance, 0.51 cubic meter at 3.60	1.84
Contingencies	1.04
Fr.	21.50

E

Analysis of the cost-price of the bridges and culverts with iron superstructure, on the 4th *section (from kilometer* 86 *to kilometer* 126).

Average cost of metal (Eiffel's system) on board at Antwerp, per ton. . . . . fr.	750.00
Freight from Antwerp to Matadi	32.00
Over . .	782.00

Brough forward.	782.00
Unloading at Matadi	1.00
Conveyance on the line.	18.40
Fitting up on the spot	300.00
Contingencies	2.60
	Fr. 1,104.00

(For memory.)

Digging, per cubic meter . . . . . . fr.	5.00
Masonry	51.00

F

Analysis of the cost-price of the aqueducts of pressed beton on the 4th section (from kilometer 86 *to kilometer* 126).

1° AQUEDUCTS OF 1^{m}20 × 0^{m}80.

Cost of one meter length, delivered franco on board at Antwerp per meter	41.50
Freight from Antwerp to Matadi, per ton	32 00
Unloading at Matadi, per meter	1 00
Conveyance on the line.	18 40
Average and breakage.	7 35
Digging and laying	12 00
Contingencies.	4 75
	117 00

Built head above the aqueduct.

Digging, 2.25 cubic meters at 5	11 25
Masonry, 5.50 — 51	280 50
Contingencies	2 25
	294 00

2° AQUEDUCTS OF 0^{m}60.

Cost price of one meter length, delivered franco on board, at Antwerp	20 25
Freight from Antwerp to Matadi, 0.360 ton at	11 52
Over.	31 77

Brough forward. .	31 77
Unloading at Matadi	0 36
Conveyance on the line, 0.36 t. × 18.40 . .	6 62
Average and breakage	3 21
Digging, laying	5 00
Contingencies.	1 04
	48 00

Built heal above the aqueduct.

Digging : 1.50 cubic meter at 5. .	7 50	
Masonry : 3 25 cubic meter at 51 .	165 75	
Contingencies.	1 75	
	»	175 00

3° $0^{m}3$ *Pipes.*

Price per lineal meter delivered franco on board at Antwerp	7 20	
Freight from Antwerp to Matadi $0^{t}120$ × 32	3 84	
Unloading at Matadi.	0 12	
Conveyance on the line $0^{t}120$ at 18.40 .	2 21	
Average and breaking	1 12	
Digging and laying	1 00	
Contingencies	1 01	
	»	16 50

Built head above the pipes.

Digging, 0,500 cubic meter at 5 . . .	2 50	
Maronry, 0,800 cubic meter at 51 . .	40 80	
Contingencies.	1 20	
	»	44 50

G

Analysis of the cost-price of the culverts with superstructure of spare-rails on the 4th *section (from the kilometer* 86 *to the kilometer* 126).

CULVERTS OF FROM 2 TO 3 METERS IN THE CLEAR WITH SUPERSTRUCTURE OF SPARE-RAILS ON THE 4th SECTION (FROM THE KILOMETER 86 TO THE KILOMETER 126).

Cost of the spare-rails, franco on board, at Antwerp, per ton	70 00
Freight from Antwerp to Matadi	32 00
Unloading at Matadi	1 00
Conveyance immediately to the building-plot	18 40
Laying.	3 00
Contingencies.	2 60
	127 00

(For memory.)

Masonry, per cubic meter	51 00
Beton —	60 00
Digging —	5 00

SCHEDULE Nº 8.

General estimate.

1st YEAR.			
Preliminary works, costs of constitution, sundries		1,250,000.00	
Staff in Africa : 31 agents, comprising 11 engineers and foremen; salaries	220,000.00		
Aliments, maintenance, medicaments	85,000.00		
Travelling-expenses	22,200.00		
	»	327,200.00	
Establishments at Matadi :			
Lodgings, furniture, infirmary, stores, work-shops, turn-tables, water-stations, pier, etc		438,000.00	
Mathematical instruments and office-expenses		10,000.00	
Construction of the first 26 kilometers (see schedule nº 6)		2,633,000.00	
Laying of the telegraph over the first 26 kilometers		9,100.00	
Purchase of 3 locomotives and 15 waggons		127,500.00	
Managing in Europa		80,000.00	
Total of the first year		»	4,874,800.00
2d YEAR.			
Staff in Africa : 37 agents, comprising 17 engineers and foremen.			
Salaries	258,000.00		
Aliments, maintenance, medicaments	104,300.00		
Travelling-expenses	27,600.00		
	»	389,900.00	
Maintenance of buildings and plant		43,800.00	
Maintenance of the way laid the preceding year		112,400.00	
Over		546,100.00	4,874,800.00

Brought forward		546,100.00	4,874,800 00
Instruments and office expenses		10,000.00	
Construction of 140 *kilometers (see schedule* 6)		4,434,000.00	
Laying of the telegraph over 140 *kilometers*		49,000.00	
Purchase of 4 *locomotives and* 60 *waggons.*		270,000.00	
Managing and expenses in Europa		80,000.00	
Total of the second year		»	5,389,100.00
3d YEAR.			
Staff in Africa : 43 agents, comprising 23 engineers and foremen.			
Salaries	296,000.00		
Aliments, maintenance, medicaments	123,000.00		
Travelling-expenses	33,000.00		
		452,000.00	
Maintenance of buildings and plant		43,800.00	
Maintenance of the way laid the preceding year		216,000.00	
Instruments and office-expenses		10,000.00	
Construction of 135 *kilometers* (see schedule 6)		4,723,500.00	
Laying of the telegraph over 135 *kilometers*		47,250.00	
Purchase of 5 *locomotives and* 45 *waggons*		262,500.00	
Managing and expenses in Europe.		80,000.00	
Total of the third year		»	5,835,050.00
4th *Year.*			
Staff in Africa : 47 agents comprising 29 engineers and foremen.			
Salaries	334,000.00		
Aliments, maintenance, medicaments	142,900.00		
Travelling-expenses	38,400.00		
	»	515,300.00	
Maintenance of buildings and plant		43,800.00	
Over		559,100.00	16,098,950.00

Brought forward. .	559,100.00	16,098,950.00
Maintenance of the way laid the preceding year	315,000.00	
Instruments and office-expenses . . .	10,000.00	
Construction of 134 *kilometers* (see schedule 6)	4,790,050.00	
Laying of the telegraph over 134 *kilometers*	47,250.00	
Purchase of 3 *locomotives and* 30 *waggons*	165,000.00	
Managing and expenses in Europe . .	80,000.00	
Total of the fourth year. . . .		5,966,400.00
Total. . .		22,065,350.00
Intercalary interests : 5 p. c. on the sums paid, to wit during an average period of two years, on 25,000,000		2,500,000.00
General contingencies (1).		434,650.00
Total of capital required. . .		25,000,000 00

In addition to this each particular item of the estimate comprises special contingencies. So the total of contingencies amounts to 10 p. c.

SCHEDULE N° 9.

Navigability of the Lower Congo.

The problem of the navigability of the Congo from Banana to Boma, has been resolved some years ago. The following is the list of the several steamers of the lines of : Walford of Antwerp, Woerman of Hamburgh and of the Liverpool Companies; these steamers have a capacity of more than 1,000 tons and ascended the river up to Boma during the last six months.

a) « Walford's Line » :

Brabo	1,650 tons.
Vlaanderen	1,675 —
Lys	1,650 —

b) « British and African Steam navigation Company » and « African Steamship Company » :

Kinsembo	1,872 tons.
Africa	1,158 —
Nubia	1,235 —
Ambriz	1,372 —
Benguela	1,186 —
Loanda	1,898 —
Landana	1,984 —
Gaboon	1,177 —
Cameroon	1,185 —

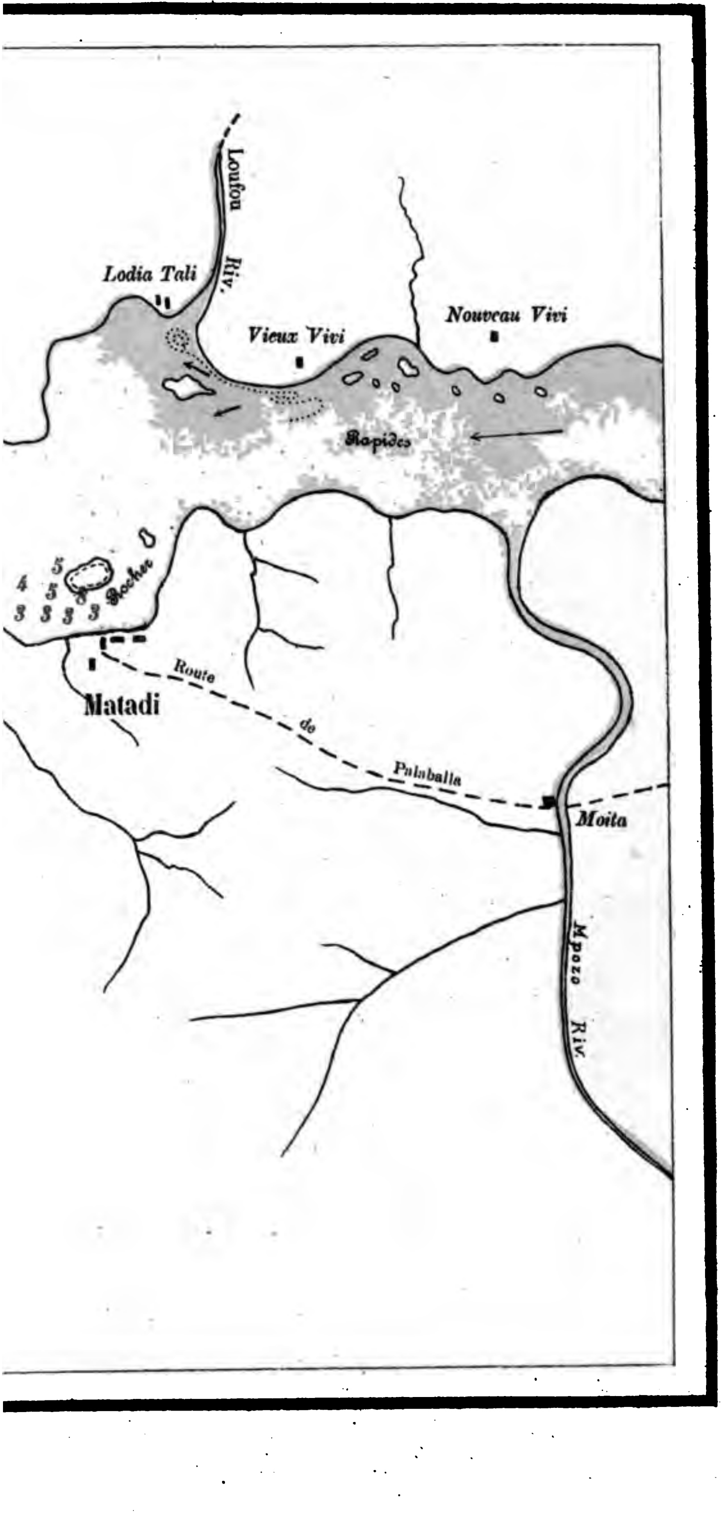
c) « Woerman's Line » :

Gertrude Woermann	1,872 tons.
Carl Woermann	1,467 —
Ella Woermann	1,226 —
Adolph Woermann	1,287 —
Lulu Bohler	1,267 —

Up to now the transatlantics do not go on beyond

Boma, where the principal commercial establishments are situated. The branch-offices, situated on the banks of the river, up to Matadi are touched at by the small steamers of the State and by those of the factories of Banana and Boma, such as : *LeHéron,* 120 tons, belonging to the State; l'*Itumba,* 155 tons, to Hatton and Cockson; the *Carl Niemann,* 250 tons, and the *Prins Hendrick,* 72 tons, to the « Dutch Company »; the *Luso,* 88 tons, to the « Zaïre Company », etc.

On that portion of the river the speed of the current increases, but everywhere depth also is considerable. Captain Boyé, chief of the pilotage of the State, has proceeded to sound the whole of that portion of the river, without stating in any point a depth inferior to 60 feet. These soundings prove, unquestionably, that any sea-going steamer, sailing with a speed of 9 to 10 knots, may without any difficulty go up the Congo as far as Matadi. Such is moreover the opinion of all the masters, who perfom the functions of pilots.


Loufou Riv.
Lodia Tali
Vieux Vivi
Nouveau Vivi
Rapides
5
4
5
3 3 3 3
Rocher
Matadi
Route de Palaballa
Moita
Mpozo Riv.

SCHEDULE N° 10.

Estimate of working-expenses.

Length : 435 kilometers.

1. *Division of the line.* – The line is divided into five sections of an average length of 85 kilometers each; at the extremity of each section, a station is to be established; each section is divided into four portions of about twenty kilometers, each provided with a halting-place with water-tank and crossing-way.

So there are 6 stations, to wit :

2 first class stations at Matadi and at Leopoldville.

1 second class station in the Kimpesse-district.

3 third class stations; one on the Lufu, one on the Nkissi and one in the vicinity of Ntampa.

In addition to this, there are 15 halting-places with water-tank.

II. *Several services.* — The working is divided into three main services :

A. Working, including the general management.

B. Service of the ways, works and buildings.

C. Service of traction and stock.

WORKING-EXPENSES.

§ I.— *General management and working.*

General management : staff and office-expenses	89,400
Working : service at the stations and halting-places	109,950
Working : service of the trains. .	22,800
Over. . .	222,150

Brought forward. . .		222,150

§ 2. — *Ways and works.*

A. Central service : staff and office-expenses	48,200	
B. Service of the way : staff. . .	157,500	
C. Implements : renewal and maintenance	12,800	
D. Maintenance of the way and the constructive works. . . .	150,750	
E. Maintenance of the buildings .	30,000	
F. Maintenance of the apparatus at the stations	12,000	
G. Telegraph : staff and several supplies.	12.000	
	″	423,250

§ 3 — *Traction and stocks*

A. Central service : staff and office-expenses	39,600	
B. Service of the depots	21,000	
C. Renewal of the stock, including implements and several supplies.	28,100	
D. Service of the trains : staff . .	31,200	
E. Fuel, grease, oil, sundries . .	56,000	
	″	175,900

§ 4. — *Medical service.*

Staff, infirmary, medicaments	22,000

§ 5.

Aliments and travelling-expenses . . .	219,100

§ 6.

Central directory at Brussels.	80,000
Contingencies.	57,600
Sum total. . .	1,200,000

SCHEDULE N° II.

Estimate of annual expenditure on the Congo for transport in the cataract region.

These expenses are occasioned :

A. By the transport of goods forwarded in the Upper-Congo.

B. By the transport of goods forwarded from the Upper-Congo to the coast;

C. By Europeans travelling from Matadi to the Pool and vice-versa;

D. By the keeping-up and general expenses of stations founded in the cataract region, with the sole object of directing the transports service.

We intend analysing these elements of expenditure in order to design their importance.

a) Transport of goods forwarded in the Upper Congo.

Number of loads transported. During the whole of last year, more than 60,000 loads were forwarded for the account of the Independent State of Congo, the dutch Company « Nieuwe Afrikaansche Handels Vennootschap », the french Company Daumas Béraud & C°, the Société anonyme belge pour le Commerce du haut Congo, and the catholic and protestant missionaries. These loads weigh 65 english pounds, or slightly less than 30 kilogrammes.

CALCULATION OF COST OF TRANSPORT OF A LOAD.

« Cost of transport from Matadi to Lukungu » : At Matadi, each carrier receives as ration 1/2 piece of fabric, value 1 fr. 25 c. At Lukungu, he receives as ration 1 piece, and as pay 3 pieces, in all 4 pieces, value 11 fr. 60 c. (The value of fabric at Lukungu and the

Pool is evidently increased in consequence of the cost of transport from Matadi.)

In all the carrier has thus received 1.25 + 11.60, or.		12 85	
As a rule, each caravan of 12 men is conducted by a head-man or « capita » who receives:			
At Matadi, as ration 1 piece, value.	2 50		
At Lukungu, as ration 2 pieces, value.	5 80		
— as pay 6 pieces, value.	17 40		
— — 1 hat, value . .	2 50		
— — 1 parasol, value .	2 50		
Total. . .	30 70		
Thus quota per load for payment to the capita		2 56	
Finally at Matadi, the capita receives per load 1/6 of a piece, value 0.41, and at Lukungu 1/6 of a piece, value 0.50, or quota per load for payment to the capita		0 91	
The transport of a load from Matadi to Lukungu thus costs			16 32
b) Cost of transport from Lukungu to Leopold ville. By similar arguments, we obtain the following results :			
Payment to carrier:			
At Lukungu, ration for the up-journey, 1 piece		2 90	
At Leopoldville, ration for down-journey, 1 piece		3 25	
At Lukungu, pay 1 1/2 piece.	4 35		
Total of payment to porter. . .		10 50	
Over. . .		10 50	16 32

Brought foward. .		10 50	16 32
Payment to capita :			
At Lukungu, ration for up-journey, 2 pieces	5 80		
At Leopoldville, ration for down-journey, 2 pieces . .	6 50		
At Lukungu, pay 3 pieces. .	8 70		
— pay 1 hat. . .	2 50		
— pay 1 parasol .	2 50		
Total. . .	26 00		
Thus, quota for payment to the capita.		2 17	
Payment to chiefs.			
The chiefs of villages claim on an average from each carrier at Lukungu 1/6 of a piece or 0.50, and at Leopoldville 1/6 of a piece or 0.54 or quota for payment to chief . .		1 04	
The transport of a load from Lukungu to the Pool thus costs.			13 71
Price of transport from Matadi to Leopoldville			30 03

In all the transport of a load from Matadi to Leopoldville costs : 16.32 + 13.71 = fr. 30.03, say 30 francs.

The expenses occasioned by the transport of goods from Matadi to the Upper Congo are thus, 30 × 60,000 = 1,800,000 francs.

B. — *Transport of goods forwarded from the Upper Congo to the coast.*

The average annual transport of ivory amounts to about 120 tons or 6,000 loads(1); the expenses on this score can thus be putdown at 30 × 6,000 = 180,000 francs.

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(1) Of course, owing to the irregular weight of tusks, the distribution of loads is less advantageous and diminishes thus the average useful weight of each load. We have admitted it here to be reduced to 20 kilog.

C. — *Journey of Europeans from Matadi to Stanley-Pool and vice-versa.*

The number of travellers, journeying backwards or forwards, between Matadi and the Pool, can be estimated at 200 every year or 100 in each direction.

Each European spends :

12 porters at 30 francs. . . . . fr.	360
Food, 5 francs a day during a month	150
Or. . fr.	510

say 500 francs.

The expenditure on this score can be put down at 500 × 200 = 100,000 francs.

D.— *Cost of keeping-up and general expenses of stations belonging to the State and Companies in the cataract region.*

In the cataract region, eight establishments have been founded in order to ensure the transport service :

Belonging to the State : Matadi, Vivi, Lukungu, Manyanga, Lutété.

To the « Nieuwe Afrikaansche Handels Vennootschap » : Ndunga.

To the « Société du Haut Congo » : Matadi and Manyanga.

To the « Cie Daumas Béraud » : Ntombo, Mataka.

The general expenses of a station are not inferior to 50,000 fr.

2 Europeans-salaries	8,000
Food.	6,000
Travelling expenses.	2,000
Over. . .	16,000

Brought forward. .	16,000
Medicine, stationary, etc.	2,000
2 black clerks, salaries, food, travelling expenses.	3,000
Keeping-up of stations and stores, payment to chiefs	6,000
40 natives, paid on an average 1.50 a day .	22,000
Sundries	1,000
Total. . .	50,000

N. B. Althougt the staff of one or two stations may be less important than that fore-seen as above, on the other hand, the staff of white men at Lukungu comprises 5 Europeans, that of Matadi 4, the black staff at Lukungu comprises more than one hundred men and that of Matadi more then sixty. On an average the figures given are considerably under the actual situation.

For the eight stations, the total expenditure will thus be of 400,000 francs.
To this must be added :

The establishments of the Dutch firm at Fuca-Fuca and at Kinchassa, the « Cie Daumas Béraud » at Matadi and Brazzaville, the missions at Tundwa, Palaballa, Lukungu, Lutété, Leopoldville and Kin chassa, the State at Leopoldville, and the « Société anonyme belge » at Kinchassa, who all employ part of their native staff for transports.

Admitting that for these twelve establishments the general expenses are put down at 100,000 francs or rather more than 8,000 francs per establishment, the total expenditure of general expenses for transport stations can be put down at, at least, 400,000 × 100,000 francs = 500,000 francs.

SUMMING UP.

Summing up these various results we conclude that the minimum annual expenditure for transports amounts to :

a) Transport of goods from the Lower Congo to the Upper Congo . . . . fr.	1,800,000
b) Transport of goods from the Upper to the Lower Congo	180,000
c) Journeying of Europeans from Matadi to Stanley-Pool and vice-versa. . . .	100,000
d) General expenses and keeping-up of stations in the cataract region. . . .	500,000
Fr.	2,580,000

Many other expenses indirectly caused by the actual difficulty of transport might find place here.

Thus we ought to add first the expense for transport, from Boma to Matadi, of merchandises and passengers going to the upper-Congo, as freight, from Europe to Matadi will not be superior to those paid now for Banana or Boma, when once the large steamers will ascend up to Matadi. One may even hope to see them diminishing as commercial movement, developped by the rail road, will have increased the quantity of transport towards the Congo.

It may be safely said that the activity and willingness of the agents of the State and trading-houses, are actually spent for the transport service, and the latter will be more usefully employed when the railway is laid. Every enterprise on the Congo is more or less hindered by the expenditure and difficulties of the actual transport service, and it would not be difficult to show that a rapid and regular organisation would diminish many of the expenses incurred even in Europe.

SCHEDULE N° 12.

History of transports by means of carriers in the cataract region.

On his arrival at the Congo in 1879, Stanley was obliged to battle with the difficulty of transports. Whereas on the east coast from time immemorial, a numerous population had been trained to this hard work in the service of the Arabs and European expeditions, at the Congo only now and then a solitary caravan laden with ivory traversed the cataract regions in order to dispose of its produce at some factory on the coast.

The patient endeavours of the agents of the International Congo Association as well as of the State of Congo afterwards have been the means of creating the important service of transport by carriers which during the past year ensured the arrival at Leopolville of nearly 2,000,000 kilograms of goods divided in loads of 30 kilogrammes.

After establishing at Vivi his basis of operations, Stanley commenced his march forward. The material he disposed of was as follows.

The steamers *En Avant* and *Royal*, two lighters, 450 loads of merchandise, in all 1830 loads.

To transport the above, he disposed of 70 Zanzibaris, 120 Loangos.

The natives only exceptionally consented to help by pulling the waggons in the vicinity of their villages, but they always refused to go further than 5 or 6 miles from home.

During 12 months labour between Vivi and Issanghila, six natives only joined the expedition in a more or less permanent manner, one of Nsanda, five of Nsala, Kindonga and Yellala.

During this first period, all the work was carried out by foreign elements regularly engaged.

The inconveniences of this system were manifold; the number of loads transported was naturally limited by the number of non-natives whose services were not utilised by the expedition itself, which number was not naturally very considerable : consequently, as soon as Stanley had passed Issanghila, taking with him all his Zanzibaris, communication with his basis of operations was suspended for more than six months.

On the other hand the price of transport was as much as 15 and 17 francs for one single load from Vîvi to Issanghila, a distance of about 70 kilometers.

The garrison of Vivi, composed of Cabindas, refused to venture inland, not even under the guidance of Europeans. A superstitious terror made them refuse to cross the Loa, an insignificant water-course at 10 kilometers from Vivi.

In February 1881, a packet of important dispatches arrived from Brussels for Stanley. Anxious that the latter should receive them without delay, the chief of Vivi succeeded, by dint of promises of extra wages in persuading seven Cabindas to accompany a European « during six days march in the interior ». On arriving at Issanghila, they refused to proceed any further, but this incident was the origin of the transport service. The fears of the garrison at Vivi were quickly dispelled on seeing their comrades return, the Cabindas consented to go to Issanghila, where a station was founded at the very moment of Stanley's arrival at Manyanga.

The Cabindas services allowed of a regular monthly transport of 30 or 50 loads to Manyanga, while Stanley, whose forces had been strengthened by a new detachment of Zanzibaris, proceeded to Leopoldville.

Towards the beginning of 1882, the situation was as follows :

From Vivi to Issanghila, land-carriage by Cabindas, price about 15 francs per load; from Issanghila to Manyanga by water — the « Royal » tugging a lighter. Price : 8 francs.

From that moment, progress was rapid.

The natives who daily witnessed the passing of Cabindas whose language was the same as their own and whose origin was similar, began to gain confidence; they at first accompanied the Cabindas, then journeyed alone, and finally substituted themselves to the latter for he Vivi-Issanghila section; the price of transport for this journey fell at once to 7 and 8 francs per load.

After the foundation of Leopoldville towards the middle of 1882 a regular and continuous service was established :

Between Vivi and Issanghila (by natives), 8 francs;

Between Issanghila and Manyanga (by boats manned by Zanzibaris), 8 francs;

Between Manyanga and Leopoldville (by Zanzibaris), 25 francs.

Thanks to the numerous re-inforcements of men sent by the Comité d'Études, a monthly transport of 75 to 100 loads from Vivi to Issanghila was established in 1882.

All this however was very precarious, the roads were constantly being closed up inconsequence of enincounters between Zanzibaris and natives, while the creation of new stations in the Upper river was every day adding to the urgency for more men and goods. It was becoming absolutely necessary to induce the natives of the Manyanga-Leopoldville region to enlist as carriers in the service of the Association.

Towards the end of 1882 an intense crisis was reigning. The two roads leading from Manyanga to Leopoldville were blocked, one on the right bank at Mowa, the other on the left at Loutété. The foundation of a station at this last locality smoothed the difficulties and tended considerably to develop the transport services, so that notwithstanding some inevitable fluctuations, towards the end of 1883 the natives undertook the sole transport of loads brought to Manyanga by the lighters plying between Issanghila and Manyanga, viz about 200 loads per month.

The cost was as follows :

Vivi to Issanghila = 8 francs.

Islanghila to Manyanga = 8 francs.

Manyanga to Leopoldville = 12 francs.

The rate of progress was constant but far from being in proportion to the wants of the expedition.

The « Livingstone Inland Mission » had been endeavouring for two years to open a direct road on the left bank from Matadi to Loukoungou by means of Kroo-boys and Loangos, but the results attained were fare from being brilliant, chiefly because of the offensive attitude of the inhabitants of Palaballa and Congo da Lemba accustomed to levy tribute on the ivory caravans.

Towards the end of 1883, Stanley decided to establish a transport service by this road.

The powerful means at his disposal enabled him peaceably to overcome all resistance, and very soon the Bacongos arrived in such numbers that transport by water from Issanghila to Manyanga was abandoned, but in 1884 the demand for carriers increased. The English missionnaries had penetrated to the Upper Congo following the footsteps of the pioneers sent out by the « Association Internationale du Congo ». The latter had just sent out the « Stanley », the largest steamer till then transported to the Pool. This achievement marked a new progress. The twelve waggons carrying the sections of the steamer were dragged by natives from the falls of Itounzima to Leopoldville. Over a thousand men were employed in this circumstance.

Since then, more than fifteen hundred men were recruited in one month by the Association Internationale du Congo, in the region extending round about Loukoungou and Ngombi. Where are now the thirty loads per month of 1882? The transport of a load from Matadi to Leopoldville had fallen from 42 to about 20 or 22 francs.

Progress will now become more rapid; the Berlin Conference has given vitality to the State, commerce includes the ressources of the Upper Congo. The « Nieuwe Afrikaansche Handels Vennootschap », the compagnie Daumas Beraud, the « Sanford Exploring Expedition » are creating factories on the upper river, and sending goods to Kinchassa and Brazzaville. Agents of the State and the various trading-houses, missionaries are crossing the country in every direction stimulating chiefs and carriers; caravans are journeying backwards and forwards in such numbers that the transport service which in 1883 only allowed of 1,200 loads being carried, which number was, in 1885, raised to 12,000 loads, has attained, in 1887, 60,000 loads.

Since then, progress has been constant, but is no longer in proportion to the ever-increasing wants, no carrier has ever been refused at Matadi and should twice the number come forward all would be engaged. Carriers must be had at any price, and in order to regulate this important service, the State has been compelled to lay down rules for the engagement of carriers.

The price of transport is now of about 1 franc per kilogramme.

SCHEDULE N° 13.

The navigable system of the Upper Congo.

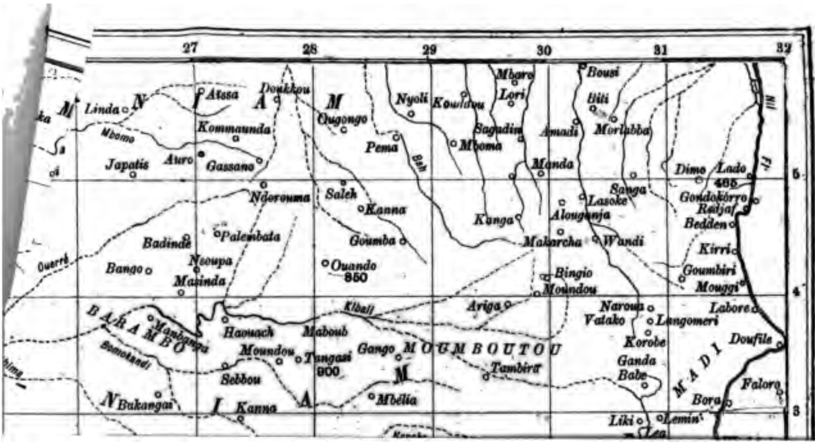
The navigable water-courses of the Upper Congo have an enormous development.

The Congo alone between Stanley-Falls and the cataract region constitutes a water-course of 1,600 kilometers in length; the Kassai prolonged towards the East by the Ikatta, Sankourou, Lomami and Louloua is accessible to steamers for a length of 3,000 kilometers, the Oubandji, Tchouapa, Loulongo and Lomami have likewise been explored by steamers for upwards of 1,000 kilometers.

These different water-courses penetrate in the most central regions of Africa. The Congo is thus the great commercial road of the continent.

At the present time, the total length of water-courses explored by steamers can be estimated at 11,500 kilometers (or 23,000 kilometers of river-side) which can be distributed as follows :

		Carried over.	5,595 kilom.
The Congo . .	1,600 kilom.	Likouala . . .	300 —
Kassaï. . . .	900 —	Bounga . . .	150 —
Ihatta	800 —	Lake Matoumba .	250 —
Lake Leopold. .	450 —	Oubandji . . .	1,000 —
Sankourou . .	700 —	Tchouapa. . .	1,125 —
Lomami . . .	100 —	Bossira . . .	360 —
Loubi	100 —	Ikélemba . . .	150 —
Louloua . . .	70 —	Loulongo . . .	810 —
Kouango . . .	300 —	Lopori. . . .	300 —
Djouma . . .	150 —	Mongala . . .	60 —
Lifini	50 —	Itimbiri . . .	200 —
Mpaka. . . .	75 —	Arouhouimi . .	200 —
Alima	300 —	Lomami . . .	1,000 —
Carried over.	5,595 kilom.	General total.	11,500 kilom.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Linda
Atssa
Doukkou
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Nyoli
Kowidou
Mbaro
Lori
Bousi
Biti
Kommaunda
Ougongo
Mbomo
Pema
Bah
Sagadim
Mboma
Amadi
Morlabba
Japatis
Auro
Gassano
Manda
Dimo
Lado
465
Nil
Fl.
Ndorouma
Saleh
Kanna
Sanga
Lasoke
Gondokörro
Radjaf
Bedden
Kanga
Alouganja
Badinde
Palembata
Goumba
Makarcha
Wandi
Kirri
Ouerré
Bango
Nsoupa
Masinda
Ouando
850
Bingio
Moundou
Goumbiri
Mouggi
Kibali
Ariga
Narowa
Vatako
Langomeri
Labore
B A R A M B O
Manbanga
Haouach
Maboub
Korobe
Doufile
Somokandi
Moundou
Tangasi
900
Gango
M O U M B O U T O U
Tambira
Ganda
Babe
M A D I
Sebbou
M
Faloro
N
Bakangai
I
Kanna
A
Mbélia
Bora
Liki
Lemin

This fluvial system is actually traversed by 16 steamers; in two or three months, this number will be raised to 18, 2 new steamers being on their way:

7 belonging to the Congo Free State : the *Stanley, Ville de Bruxelles, Ville de Liége, En avant! Association internationale africaine, Ville de Gand* and *Ville de Verviers,* the two latter are being actually transported.

3 on the french Congo : the *Alima,* the Ballay and the *Djoué.*

5 belonging to the « Société anonyme belge pour le commerce du haut Congo : the *Roi des Belges,* the *Florida,* the *New-York,* the *General Sanford* and the *Baron Weber.*

1 belonging to the dutch company « Nieuwe afrikaansche Handels Vennootschap », the *Holland.*

1 to the french company « Daumas Béraud and C° », the *France.*

2 to the Anglo-American christian missions, the *Peace* and the *Henry Reed.*

All these are light-draught boats not drawing more than 2 feet 6 inches of water, with the exception of the *Alima,* drawing we believe 3 feet 6 inches.

The channels being imperfectly known, very prudent navigation is absolutely necessary and not wholly unattended with danger : this circumstance explains the importance of light-draught boats, though channels must exist allowing of heavier boats to pass in safety.

We hasten to add that no disaster has as yet occurred as concerns the Upper Congo flotilla. The latter includes single. and double-screw steamers, stern wheel, and paddle. All the hulls are built of steel, except the *Ville de Bruxelles,* whose hull is of wood. The latter is the largest boat of all and capable of carrying 80 tons; the *New-York* is the smallest, carrying only 4 tons.

SCHEDULE N° 14.

Liste of the products which actually may be exported from the Congo.

DESCRIPTION OF MERCHANDISES.	VALUE ON 10th APRIL 1889 ON THE LIVERPOOL MARKET.	REMARKS.
Palm-oil.	470 francs per ton.	Worked in the Lower-Congo, to be found everywhere.
Palm-almonds	From 234 to 253 —	— —
Decorticated earth-nuts .	— 253 to 303 —	— —
Caoutchouc	— 1 60 to 1.80 per pound.	— —
Ivory.	— 18 to 27 francs per kilo.	— —
Sesame	— 50 to 63 — per 384 pounds.	— —
Coprah	— 253 to 303 — per ton.	On the coast.
Red copal-gum	— 107 to 120 francs per cwt.	Everywhere on the river bank.
White —	— 44 to 53 —	— —
Guinea-seed	— 38 to 47.50 —	To be found everywhere.
Pepper	— 20 to 55.40 —	— —
Ginger	— 17.70 to 24.05 —	— —
Ricinus (castor-oil plant) .	— 14 —	— —
Bees' wax	— 114 to 133 —	— —
Orchilla	— 44.25 to 47.50 —	— —
Kola-nut.	— 25 —	— —
Baobab-fibers	— 200 francs per ton.	— —
Tobacco	— 1 — per pound.	— —
Cotton	— 0.60 — —	— —
Camwood	— 228 to 380 — per ton.	Great quantities to be found in the Upper Congo.
Ebony	— 101 to 167 — —	— —
Coffee	— 95.50 to 103.75 per cwt.	Thrives well at Leopoldville; grows wild in the Upper Congo.
Cocoa	— 41.75 to 77.15 —	Thrives well at Leopoldville.

SCHEDULE N° 15.

Agreement between the Independent State of Congo and the Congo Company for trade and industry.

Between the undersigned,

General Strauch, Administrator general of the Department of Interior, Hubert Van Neuss, Administrator general of the Department of Finance, and Edmond Van Eetvelde, Administrator general of the Department of Foreign Affairs and of Justice, the latter three acting in the name of the Independent State of Congo, specially empowered for the ends herein mentioned by decree of His Majesty the King, Sovereign of this State, dated the twenty-fifth day of the present month, on the one hand;

And Messrs Gustave Sabatier, member of the Chambre des Représentants for Belgium, Jules Urban, engineer, Adolphe De Roubaix, merchant, and Albert Thys, captain, and orderly officer to the King, the first named being president, the second vice-president, and the two last delegate managers of the « Compagnie du Congo pour le commerce et l'industrie » acting in the name of this Company, in virtue of article 24 of their statutes, and of the powers specially conferred upon them by the board of the said Company in its sitting of the 9th of February last, on the other hand :

It has been agreed as follows:

ARTICLE 1t.

The Company undertakes to carry on at their expense the complete survey of a railway connecting under the most favourable circumstances the lower Congo with the Stanley-Pool.

The said railway tc be entirely within the limits of the Independent State of Congo. It may be laid in two sections connected by a navigable portion of the river.

ARTICLE 2.

The survey to be completed within a delay of eighteen months — unless unforeseen circumstances — under penalty of cancelling of the present agreement and, at the expiration of this period, the Company shall hand over to the State a record of the survey including the plan of the line, profiles, general plans of bridges, aqueducts, etc., buildings and dependencies, types of material, and an approximate estimate.

The Company shall likewise hand over to the State a justifying abstract of all expenses incurred for the carrying out of this work.

ARTICLE 3.

The State grants to the Company — in compensation of the said survey and subject to the restrictions contained in article 7 hereafter to follow — the possession in full of 150,000 hectares of land, to be chosen by the Company, at the latest, three months after handing over to the State of the above-mentioned survey.

During the course of its work, the Company to be allowed the right of option by designating to the State those lands which they are desirous of reserving for themselves; the Company to be allowed provisionally to take possession of those lands, and to work the same to the best of their interests, while they shall become the definite property of the Company, only after having handed over to the State the above-mentioned work.

ARTICLE 4.

During a delay of eighteen months, from the handing — over of the survey, the Company shall have the right of option for the concession of the laying of the line and the working of the same during a period of 99 years according to the conditions of a contract drawn up previously.

Should the Independent State of Congo be desirous — after the term of eighteen months, and within the three years which shall follow the handingover of the survey — of adopting a different contract than the one proposed to the Company, it is understood that previous to the adjudication, the latter shall be admitted to exercise the right of option granted to them by the above-mentioned paragraph.

At the expiration of the above-mentioned term of 99 years the railway and its dependencies to become the property of the State.

ARTICLE 5.

The State guarantees from this very moment to the Company, should the latter avail itself of the right of option stipulated in article 4, a minimum of advantages as follows :

a) The concession of all lands necessary for the plant of the line and its dependencies, including landing and embarking quays at each terminus of the railway; these lands to be, if necessary, expropriated by the State, and handed over to the Company without expense for the latter. It is understood that all combinations will be adopted in such manner as to avoid expropriations as much as possible;

b) The concession in full, subject to the restrictions mentioned in article 7, of all lands which the Company is desirous of obtaining proportionately as the laying of the line is proceeded with — in a zone of 200 meters depth on each side of the line;

e) The concession in full of 1,500 hectares of land, for each kilometer of railway laid, and opened to traffic. These lands to be chosen by the Company in one, or several lots in any part of the territory belonging to the State, subject to the restrictions mentioned in article 7; the Company to make this choice and enter into definite possession of the lands, either as the various sections of the line are gradually opened to traffic, or within the five years which shall follow the entire completion of the line.

ARTICLE 6.

The lands designed for the laying of the railway and its dependencies to be exempt from all taxes and duties during the whole of the concession. The other lands granted to the Company to be in all respects placed under the same regimen and subject to the same legal provisions as lands belonging to private persons or companies.

ARTICLE 7.

It is understood that the lands mentioned in article 3 and letters *b* and *c* of article 5 shall be taken from among vacant lands belonging to the State, and not occupied by natives, and that the rights of hire, or others existing at the moment when the Company shall make its choice must be respected.

The Government being entitled to require that each lot of land chosen by the Company along the Congo or its navigable affluents shall not have more than 2,000 meters of river side, and be separated from any other lot granted to the Company, by a length of river side of 2,000 meters.

The Government reserves besides for itself those sites which they will esteem to be necessary for the needs of Administration, as well as those which the will esteem to be immediately or hereafter designed for works of public utility others than those of the railway or its dependencies. The Government will point out these lands at the time when the Company will make its choice.

ARTICLE 8.

Should the Company not avail itself of the right of option specified in article 4, the railway survey shall remain the property of the State, and the latter shall have the right of granting the concession of the line to any other Company or laying the railway themselves on condition of imposing on the concessionary builder the reimbursement in cash of the sums spent on the survey, or re-imbursing the same themselves. It is understood that in such case the subsidy mentioned in the following article shall cease to be paid to the Company.

In the latter event the Company shall gratuitously give back the lands which they have occupied or chosen in virtue of article 3, but only in as much as those lands shall be necessary for the laying of the line or its dependencies.

ARTICLE 9.

The Independent State of Congo agrees from this very moment and until the expiration of the eventual concession of 99 years, to grant annually to the Company as subsidy 20 per cent on the net produce of export duties collected during the previous year; this subsidy however is never to exceed 5 per cent of the capital which the Company shall have spent up to the end of the said year for the survey, and eventually for the laying of the line, nor can any sums be carried over from one year to another.

ARTICLE 10.

Should the Company avail itself of the right of option stipulated in article 4, special accounts shall be kept by them for the working of the railway, and the profits realised by such working shall be divided as follows, the subsidy stipulated in article 9 being included among the receipts :

1° 5 per cent to the legal reserve;

2° 6 per cent interest on sums spent on survey, laying of the railway, and implements of the way;

3° The surplus to be divided between the State, and the Company at the rate of 40 per cent for the State, and 60 per cent for the Company.

ARTICLE 11.

The State may appoint two delegates, who shall be entitled to attend all sittings of the board and general council of the Company with consultative vote, and to examine any books or documents relating to the business of the Company.

ARTICLE 12.

The Government recognises the legal existence of the Company in the territory of the Independent State of Congo.

The Company shall neither modify their statutes, join any other Company, nor transfer part or whole of the above-mentioned concessions and privileges without the previous consent of the Independent State of Congo, under penalty of cancelling of the concessions and privileges conferred on them by the present agreement.

The Company however, according to the rules of common right shall freely dispose of all lands granted according to article 3 and letters *b* and *c* of article 5, and that from the day when the Company shall legally become proprietor of the same.

Drawn up in Brussels in two copies, at the seat of Government of the Independent State of Congo, on the twenty-sixth day of March eighteen hundred and eighty-seven.

For the Independent State of Congo :

(S.) STRAUCH.
HUB. VAN NEUSS.
EDM. VAN EETVELDE.

For the Compagnie du Congo pour le commerce et l'industrie :

(S). G. SABATIER.
URBAN.
A. DE ROUBAIX.
ALB. THYS.

SCHEDULE N° 16.

The Ouroua and the Katanga. — Exploration of the Lomami.

The Ouroua and the Katanga are the countries situated to the west of lakes Bangweolo, Moero, and the southern part of the Tanganika, in the great expanse of frontiers, limiting towards the south-east the territory of the State. (See map of the Congo, annex n° 23).

Few travellers have as yet visited these regions, Cameron, Reichard, Capello, Ivens and Arnot. Their descriptions are most enthusiastic. Cameron says that « all the central regions constitute a marvellous country, the produce of which compares favorably as regards diversity with the richest countries of the globe ».

« Gold, says Cameron, is to be met with in the Ouroua, and the Itahoua, as also in the Katanga. Hamed ihu Hamed showed me a calebash, capable of containing about a pint, full of grains of gold, varying in size from a buskshot to the tip of my little finger. I asked him where he had found these nuggets, and he answered that they came from the Katanga and had been found by some of his slaves, while cleaning out a draining-well. The latter had brought them to him thinking he might use them as bullets. Not believing that such small particles could be of any good, he had not extended inquiries further or endeavoured to obtain more. The natives are aware of the existence of gold, called by them white copper, but it is so soft as to be of little use to them, and they prefer red copper. At Benguela, I have heard it said that gold had been found in the copper brought from Katanga, and that all the copper had been bought up by a company in order to extract the precious metal. »

Captain Cambier, during the two years he resided at Tanganika, often heard the Arabs and natives declare that there was plenty of gold at Katanga, where silver, mercury and copper are found in abundance.

« A native of the Ouroua, says Cameron, sold me a silver bracelet, manufactured in his district or the neighbourhood. Cinnabar is to be found in great quantities in the Ouroua near the capital of Katanga. Copper is found in considerable quantities in the Katanga, and even beyond the limits of this province. »

More to the east, still according to Cameron, coal is found.

« Djouma says he had visited the gold mines of Katanga; he had been to Msama near lake Moéro, where he had found coal of which he gave me a sample. »

Capello and Ivens, whose testimony can not be suspected, greatly praise this country and what is even more important from our point of view, declare it to be adapted to European emigration.

« All the high land, says Capello in a lecture at the Geographical Society of Paris, which extends from the north to the 6th parallel and stretches between the 25th and 31st degrees, constitutes one of the richest countries in Africa, with the most brilliant possible future in store. Covered with soil of the most wonderful fertility, watered by rivers such as the Louapoula and Loualaba, excellent means of communications between the extreme points of the land, abunding in exceptional mineral richness and an infinity of natural produce situated at an average 1,400 meters above the level of the sea, these regions are worthy of serious studies for without doubt Europeans can establish themselves there and live.

The above information concerning the climate is confirmed by Reichard :

« A cold damp wind passes over the plain causing the half-clad men to shiver. In the Katanga, I have observed the lowest temperature (+ 05 cent.). If the natives are to be believed, frost is sometimes observed. Almost in spite of oneself, one is tempted to indulge in the luxurious sensations of cold reminding one of the German mountains.

Arnot, the missionary who inhabited the Katanga during two years (1886-1887), had established his residence at Moukourrou near the Loufira, one of the most considerable affluents of the upper Loualaba. He gives a brilliant description of the country :

« The number of villages in the neighbourhood of Moukourrou, he says, is considerable.

During a two hour's excursion, I counted forty-three, all of considerable size; the soil in the vicinity is cultivated. The town of Moshidé is very large and densely populated; its length is about 12 or 15 miles. The ground is entirely covered with fields in the middle of which flows the Ounkeya, but groups of native huts are scattered about everywhere. Here and there are centres where the king has his own houses together with those of his subjects. The peace and quiet reigning there is remarkable.

The ground is tilled in October; it is a pleasant sight to see the natives at work in the fields. The greater part is done by the men. The king, accompanied by drum-beaters, has himself carried in a sedan-chair, and watches his subjects at work.

The river-banks are covered with fan-shaped ferus, orchids and every variety of tropical plants.

Game abounds, the plains covered with troops of gazelles, buffaloes, elephants, etc., offer a very splendid sight.

The weather canbe extremely warm without being stifling. The atmosphere is always transparent, there are no thick and gloomy fogs as in the valley of the Ba-Rotsé. My health always remained excellent, and I am happy to think that my successors will find a healthy country.

The exploration of the Lomami, whose sources are situated on the western limits of the Katanga, has called public attention to these regions described by explorers in glowig terms, the opening up of which seemed likely to be long delayed, means of communication not seeming to be available.

The Lomami which throws itself into the Congo slightly below the station of Stanley-Falls, has been proved to be a natural access to the Ouroua. The steamer *Roi des Belges*, having on board M. Delcommune and belonging to the « Compagnie du Congo pour le commerce et l'industrie », ascended the Lomami as far as Nyangoué; the river was still important and accessible to navigation. Wissmann and Lemarinel have proved it to be navigable two degrees higher up, and Cameron, who ascended the right bank, at a higher point than was reached by Wissmann and Lemarinel declares it to be navigable there also.

At any rate, the navigability of the Lomami as it is proved to day, must singularly facilitate the opening up and working of this salubrious country celebrated throughout all Africa for its mineral wealth.

SCHEDULE N° 17.

The workmen of the Railway.

We class in two categories the workmen to be engaged : *Excavators* and *helpers* and *men of trade.*

For the recruitment of black excavators we may rely upon :

A. Men not belonging to the Independent State of Congo;

B. Natives of the State enlisted out of the railway region;

C. Natives of the cataract region.

A. The recruiting of the first category may be effectuated in several parts of Africa itself :

1° *On the western coast.* The *Krooboys*, stout workers, enlisted on the coast of Kron of Monravia at Cap Palmas. The railway from Loanda to Ambacca has found in this region their best workmen; a considerable number of them went even to the Panama : They know since a long time the Congo, as the State as well as commercial firms are employing them constantly. The salary of the Krooboy is from fr. 0.75 to 1.25. The transport will cost about 20 francs.

The *Why* enlisted lately in Liberia for the service of the Independent State of Congo are docile and devoted servants. A large number of them may be obtained. Their wages are the same as for the Krooboys.

The *Haoussas* enlisted on the Slave-Coast, principally at Lagos, were especially enlisted as soldiers. Nevertheless at several times, more particularly at Leopoldville in 1883 and at the time of the transport of the *Ville de Bruxelles*, they have been employed in earthwork, with very satisfactory results. The wages of an Haoussa are fr. 1.25 per day. His transport costs 30 francs.

The *Loangos* and *Cabindas* have been employed at all times in the factories of the Congo and in the establishments of the State on the lower river. They are very available workers so much the more disposed to be rendered to the Congo, as there the find themselves in the midst of tribes using nearly the same language as themselves, and as everywhere on the river they are meeting countrymen. This people engage on the spot, so that no transport is to be paid; their wages vary from fr. 0.50 to 1 franc per day.

The portuguese government enlist at Mossamedes workers for the planters of S. Thomé. These workers are highly appreciated.

2° *On the eastern coast of Africa* the State have enlisted *Zanzibaris* and *Caffers*. The Zanzibari, although he excells in no kind of work, complies with any of them; he is more or less proper for any trade and possesses remarkable aptitudes to assimilate any work. He makes himself a carrier, excavator, mason, carpenter and even a blacksmith, if necessary. The Caffer has many of the qualities of the Zanzibari, besides docility, although he has less force of resistance. After all they are very valuable auxiliaries, who always may be obtained in great number.

Their wages are 25 francs per month, more the travelling-expenses which amount from 125 to 150 per head.

B *Natives of the State enlisted out of the cataract region.* — The principal center of recruitment known up to now is to be found with the *Bangalas*. It would be useless to repeat all what has been reported by the most reliable traveller about these workers. The results will speak for themselves. Actually the Bangala is accustomed to change his residence in order to enter the service of Europeans. It is now a habit for them, as it is since time immemorial for the Krooboys on the western coast, for the Wanyamonozi, for the Zanzibaris on the other side of Africa. Such movement will continue increasing, as every contingent who return at home consolidate the confidence, and covetousness is excited by the sight of the wages they bring with them. Thus the ground is admirably prepared for recruitment, and we may advance without hesitating that these tribe will supply a great number of hands. The Bengalas are stout and intelligent; they have proved to be good excavators, who work with animation and emulation.

The actual wages of a Bangala are 1 1/2 *laiton*, the actual value of which in Europe is from 12 to 13 centimes; this figure will not be long increasing.

C. *Natives of the cataract region.* — Finaly in the very cataract region, numerous workers may be enlisted. Conclusive experiment have been made on the subject and the only objection made up to now was the question : Shall the black engage for that kind of work out of his habits? Whoever has been observing african matters since some years knows very well that this objection does not stand. The native of that region is a carrier, but he has not been always a carrier. He became a carrier because it was the only kind of work proposed to him first; now, when he was asked to put themselves to the heavy waggons of the *Stanley* he did not fail, he did not refuse such new kind of work. At Manyanga, then at Lukungu and then at Lutete more than a thousand of them have been enlisted every time in less than eight days.

In spite of such proof the same objection has been made again as, at the end of 1887, the *Ville de Bruxelles* and the *Roi des Belges* were to be transported. They said : the natives of the Northern bank will not drag the waggons. Nothing of that kind happened : the negroes of the right bank were not more obstinate than those of the left river and the heavy waggons arrived at Isanghila dragged exclusively by natives. Even a great number of them were employed in repairing the road, and they did not feel more reluctant to that work than to any other.

In fact the important problem of manual labour in that region has been resolved from the very day, when the first native transported a parcel for an European. At present every thing can be obtained with tact and money.

Men of trade. — Black men of trade are to be engaged rather exclusively among the non-natives. The english possessions of the Gold-coast will supply a great number of masons, carpenters, blacksmiths, stokers properly acquainted with their trade. A rather considerable number of them has been employed by the independent State and generally have complied well. Wages are from 75 to 125 francs per month.

Carpenters and masons are to be found also among the Cabindas; the wages are slightly inferior, as the worker is generally less clever. They are paid from 50 to 75 francs per month.

It would be easy also to recruit masons in the Angola province, where the rate of salary is nearly the same.

Finally among the Zanzibaris and the Cafers many men of trade may be met with; at all events, as has been stated above, this people possess great aptitudes to assimilate such trades, so that they may be employed under the survey of other clevers workmen.

Conclusion. — We think that the manual labour will be met with in Africa and principally in the Congo itself. This is a rather important matter. For, if we can leave in the very country the greatest portion of the wages, we shall make it rich before working it.

SCHEDULE N° 18.

Cattle.

LOWER CONGO. — Since many years ago, there existe rather important herds of large cattle in the Lower Congo. That of the portuguese firm Valle and Azevedo of Boma, dates from more than ten years; the most of the animals were born at Boma; there are actually 200 of them.

The State possess since four years, also at Boma, two herds; one for reproduction, the other one for consumption.

At the end of February last year, they reckoned 111 heads.

In 1886, M. de Roubaix, of Antwerp, begun importing cattle to the Mateba island (between Boma and Ponta da Lenha), 3 draught-oxen had been purchased at Mossamedes; as practice proved the pasturages of the island to be excellent, 1 bull and 3 cows were imported from Madeira.

The milk, the butter and the cheese being of first quality and reproduction taking place under favourable conditions, a further purchase of 50 cows and bulls was made soon afterwards; the results continuing to be satisfactory, the herd was raised to 7 bulls and 115 cows.

To day, success is complete and conclusive. Actually the Mateba herd reckons 300 heads able to compete with the finest cattle of any country. Last year, reproduction yielded 110 calves.

FALL REGION. — Up to now no experiment has been made in this region except at the Lukungu station. The cattle imported is also very beautiful and reproduces under excellent conditions.

STANLEY-POOL. — Since three years, cattle has been imported at the station of Leopoldville.

The first animals came from San-Salvador; other ones, were sent from the Lower Congo; but the difficulties of the journey across a region of 300 kiloters in a country where roads are unknown and where no means are mañaged for river-crossing, prevented the herd from developping, so that it only consist of 8 cows and bulls and three asses. Reproduction of both, cows and asses, is perfect.

KASSAI. — In the Kassaï basin, where up to the last years bulls and cows were animals unknown to the natives, there are now to be found herds of twenty and thirty heads, of the Angola species imported by the Portuguese and more recently by the membres of the Wissmann's expedition, who brought with them about 60 heads of large cattle which on the banks of the Louloua magnificient always green pasturages, continue acclimatization and reproduction with success.

At the time of the last mail from Louloua, the herd of that station reckoned 12 bulls and cows.

Invited by the example given by the Europeans, the native chiefs also begun to wish their cattle-herds and they avail themselves of any opportunity of procuring some animals.

In order to encourage this movement and to favour reproduction, doctor Wolf incited the native chief of Louloua to renounce any tax in cattle from the deputy chiefs, where he would find altogether bull and cow. The result has been that every one endeavoured to procure the wanting cow or bull.

STANLEY-FALLS. —The bovine race of the east has been imported by the Arabs on their establishments from Kassongo and Nyangoué as far as the Stanley-Falls.

The first care of Tippo-Tip on its arrival in June 1887 at his residence at the Falls consisted in electing out of his herd a cow, to send it to Leopoldville for the native chief of Ngaliema, to whom he had promised to do so, at the time of his passage at the Pool.

UPPER OUELLÉ. — As for the region of North-East, bathed by the Ouellé and its upper affluents, there is a splendid race, of which doctor Schweinfurth has seen some samples at Maconza's place, while doctor Junker, who penetrated more on towards the South saw the immense herds of from 800 to 900 animals in the fertile plains of kaknak.

Stanley, on his turn, also points out the presence of numerous herds of cattle in the flat region, which extends westwards from the Albert lake to the springs of the Arontanimi, where he passed lately on his way to relieve Emin-Pacha.

Thus you may stay in the Lower Congo, in the cataract region, at the Stanley-Pool, or penetrate as far as Kassaï, the Falls or the extreme provinces of the North-East, every where you will meet the proof of the existence of the bovine races and of excellent pasturages for their subsistance.

Without any doubt, the occupation of the country by the Europeans will in a short time have as consequence the foundation of agricultural settlements for cattle-breeding.

A Belgian Society has just been founded in order to found an establishment of the kind in one of the districts to be traversed by the railroad.

SCHEDULE N° 19.

Social and political condition of populations inhabiting the regions to be traversed by the railway.

The south bank of the river, from the Congo-Portuguese frontier near Noki to the approaches of Stanley-Pool is inhabited by the Bacongo tribe.

The social condition of the Congo natives is in more than one respect similar to the old feudal organisation of Europe.

Large States are however extremely rare, not a single one exists in the cataract region and even the authority of the great chiefs is limited.

In reality, each village, we might almost say each free man is independent, hence the arising of frequent strifes not only between villages, but also between inhabitants of the same village.

The free man, or rather the nobleman « mfumu » is surrounded by a group of clients improperly called by us « slaves » : this group comprises his children, wives and servants. The latter are sometimes bought, but are more frequently born in this condition, their fore-fathers having been from time immemorial in the service of the same family.

The family comprises the whole group. Every « mfumu » has two classes of wives : those, which having bought, he can dispose of when he pleases, and those which he receives from his fellows in exchange for presents. Separation in the latter case is possible only by a regular divorce viz. sending back the woman to her original owner, who returns the presents given in exchange.

If the « mfumu » feels that he is sufficiently powerful, he forms a village with his group or else several « mfumu » federate and form a village, where each group is distinctly marked out. The oldest man assumes the direction of palavers where all questions interesting the community are decided. This ancient chief's « kurnutu » successor is his sister's eldest son; she regulates the succession of powers, but not of property which is divided between the children, free or slaves.

Should a « mfumu » consider himself sufficiently powerful to establish a new village, he is at liberty to do so, but his successor must receive investiture at the hands of the former « kurnutu ». Hence the numerous subdivisions of power and the extreme difficulty of delimitating the districts : land belongs to all, man alone is submitted to certain obligations, and it is not unfrequent to find a village depending of a « kurnutu » completely enclosed in another group.

In the districts of the lower Congo in the vicinity of the river, villages are scarce and the population scanty, but in the interior numerous and populated villages are to be met with.

Thus Mouala in the region of the Inkissi, visited in 1886 by lieutenant Hackanson of the Congo State, is in reality a town of about 2,000 inhabitants.

Mayala in the neighbourhood of the Pool, visited by Cambier, numbers 1,500 inhabitants.

On the upper Lousadi and in the valley of the Loukounga, populous districts are to be met with in uninterrupted succession.

Justice is administred by the « mfumu » or in case of agglomeration by an assembly of « mfumus » Penalties are very severe : fines or death. Emprisonment is unknown. Robbery, manslaughter, violation are punished with death. Nevertheless, if the criminal is rich, he may redeem himself or have a slave executed in his stead. If the offence has been committed on the market penalties are aggravated.

When the chief of a groupe renders himself guilty of an offence towards the chief of another group, sanction of the judgment becomes difficult, and war is forwith declared between the two groups. War consists in a series of encounters in which all the men composing the group take part, and where there is more noise made than anything else. The usual results are destruction of property, and burning of villages. Peace is declared after numerous palavers between chiefs designed by the two parties. Such arbitrators sit in public, surrounded by the whole population and they are paid by the convicted man. If the convicted refused to submit to their sentence they are obliged to proceed against him jointly until the sentence having been fulfilled.

All these populations are addicted to the worship of fetishes in its most primitive form. Each village possesses a series of idols fashioned out of various materials and endued with peculiar virtues. Every house has their gods, every individual his amulets. Outside of this primitive belief is the worship of a supreme being « Zambi » too powerful an abstraction of divinity to interfere with terrestrial affairs and very difficult to be informed about. The dead repair to the dwelling of Uzambi unless their earthly career has been too reprehensible, in the latter case they become Zimbouloumboulou, beings whose origin is unknown.

The fetishman possesses unlimited power; any man free or slave may on his demand be submitted to the ordeal by poison or « caska ». Woe betide the man accused of witchcraft by public opinion skilfully stimulated by the fetishman. Nothing can save him from the trial by ordeal, inoffensive drug, or terrible poison, according to the will of the fetishman. The State is fortunately putting down this barbarous custom.

There thus exists in Africa a social organisation whose manifestations are interesting by the similarity which they bear to the primitive organisation of our own civilisation, but offering no cohesion as religion is a source of division rather than of unity.

Consequently the invincible resistance to be coped with in regions where Mahommedanisme had gained a foothold, need not be feared as concerns the negro populations.

On the contrary hopes may be entertained of their placing themselves of their own accord under the salutary and conservative influence of a regular government.

We quote with reference to the above the words of Colonel de Winton, the first Administrator general of the Congo Free State :

« You will readily understand that a country composed of small communities, where a few villages form a kingdom, will accept with good grace a government established according to European principles. In my opinion, this fact and the commercial instinct of the native are the two most potent factors in the future of the new State. One is a guarantee of security, the other invites to commerce, and I do not think that in any other part of the non-civilised world a territory can be found offering such considerable advantages as the Congo regions. »

SCHEDULE N° 20.

Commercial aptitudes of the negroes.

« The native of Africa » says Stanley « come into the world a merchant. »

This statement made at the conference of Berlin contains all what we earned from the african explorers about the commercial aptitudes of african peoples.

Their unanimous opinion is that the sole thought of those populations is absorbed by traffic :

« They are great traders », says Du Chaillu, the french explorer « and if some day the rivers would be opened freely to the speculations of the white men, the luxuriant resources of the country would soon develop, owing to the natives' passion for trade (1) ».

Perhaps the negroes' ardour for trade will be the best chance for the success of the african enterprise.

When the European met the fierce races of America he was not capable to enter into contact with them : they retired from the European and in fact the red race have not been subdued, they have been suppressed. Nothing of that kind would to be feared in Africa. The negro, incited by his highly developped commercial faculty, is naturally disposed to approach the white, to enter in connexion with him, to become his auxiliary. Thus by the frequentation of races we shall in the end not extirpate the black race, but rather on the contrary, fortify, civilize and later on emancipate them.

The development given everywhere to the institution of markets is a proof of the practical spirit of the negro with respect to trade.

Such institution exists and works everywhere in

Equatorial Africa. In the region comprised between Matadi and the Stanley-Pool, on the way generally followed by the caravans, such markets, where the natives come and exchange the produces of their soil, their hunting, their fishing or their industry take place every four days. There is one in every inhabited district.

Policy is very severe : Robbery is punished with death, wherever the influence of european establishments has not yet produced sufficient effect.

In the region of the Upper Congo, between Nyangoué and the Falls, Stanley also points out the existence of markets taking place on the river-bank at intervals of about one league, on open places where the vicinity meet, and which during the whole duration of the market are declared to be neutral territories, exempt from any tax and which nobody is entitled to claim for his personal use.

On his turn Livingstone describes the markets of Mangema :

« There are markets every three or four leagues, visited by people coming from very far distances, as it is a feminine institution which has entered their habits as well as shopping in our country... It is an important institution in this country ».

In the Kassaï the ardour of the native for traffic is not less vivacious. The steamers which ascend or come down the river are followed immediately nearly every day by natives in boats, plying the oars in order to keep the level of the ship and soliciting the passengers by their offers of produce of every kind. On the rivers the sight is the same : while the steamers are passing the landing places of the villages are covered with a sympathie crow, who exibit home-made fiber fabrics, fire-wood for the steamer, goats, fowl, bananas, manioc, etc., etc. Within the space of two hours captain Thys bought 10 tons of firewood ad a halting-place at the rate of one blue pearl for every four logs.

Besides commercial connexion are very active between the several tribes, and the trade caravans, comprising from 15 to 20 boat are tracking the navigable water-courses.

The native traders of the Baŋgalas-district already accounted for the profit to be obtained, in the interest of their important trade, from the protection granted by the State, to whom they pay a small tax in exchange of a permit of free circulation on the river as well as of a flag for each of their trade-pirogues, intended to ascend or to go down the Congo.

It is not seldom to see at the Bangalas-station flotillas of 10, 15 and even 25 pirogues loaded with merchandises, coming from their tribu, for exchange of flags and permissions of navigation.

SCHEDULE N° 21.

Introduction of coined money.

Nearly everywhere there exist monetary units used by the natives for their transactions. Such moneys vary from one region to the other, according to the wealth of the population, their special trade and often even to local circumstances. For instance over the whole region, rather improductive, which extends on the coasts from the Logé-river to the Congo and inland from the coast up to Ngombi, the money used is represented by a blue hexagonal glasspearl, coming from Gablonz in Bohemia. This country, constantly traversed by caravans of native ivory-traders, wanted a money easy to be conveyed, of very trifling value and able to be divided infinitely, as the only trade has for object the sale of provisions.

These several conditions were perfectly answered by the blue pearl « matar »; and the want of that article on the coast became considerable. But, since the movement towards the factories of the coast begun diminishing and the ivory caravans rendered themselves preferably towards the Congo, where they can reach in about ten days, with their own provisions, the use of the matar disappeared nearly completely to the amazement of the pearl-makers who could not understand why the want of such a diffused article should cease from one day to another.

At present, owing to the increase of portage service the cataract region becomes enriched. We remember the time when, on the right river, scarcely visited by the trade-caravans, rather without connexions with european merchants, there existed a monetary unit of absolutely indigenous origin, say pieces of fabrics made of ananas- or of palm-fibers- and measuring about 0.30 × 0.30.

Immense quantities of this article were to be found on the markets of the Babwendes, and the Bacongos manufactured them for their transactions with those tribes. This money has disappeared now along the way of the caravans, and by and by brasswire or *mitako* is becoming the general money for the whole region.

The mitako consists of a brass-rod about 2 1/2 millimeters thick and from 52 to 55 centimeters long ; its actual value in Europe is about 7 centimes. It will be understood that that unit only can be employed in regions where all things are relatively dear. Thus still in 1880 the mitakos were scarcely known elsewhere than on the upper-river for the ivory-transactions. Over an immense region, from Leopoldville to the Bangalas, on the Kassaï to the Mouchié, the mitako is the only monetary unit.

Farther the mitako is known and received like our coined money.

Together with the mitako there exists a divisional money : here the cowry, there the blue glass-beads, the mincatas, small copper-rings. Finally, if we enter the region which had been come to by the south, we shall find, in the vicinity of Luluabourg, the red-copper saltire crosses from Katunga. On the Sankourou we find the iron-hoes of the Wagogos and the Manyemas, showing the ancient connexions with the Nyangoué market.

Thus over the whole of the immense extent of the State there exist several moneys and it may be stated that one of them, te mitako, is actually about to depose the other ones. Should it be quite difficult under such circumstances to introduce a real coin? We don't think so.

As generally in the factories the stores of indigenous products (or purchase-articles) are separated from the pay-stores (fetiches) the european traders have established the habit of paying the purchased merchandise only at fixed hours after all the purchases being concluded.

In order to prevent any contest, they deliver to the vendors a bill payable at sight (*mokanda*) to be paid as soon as the merchant is able to go the to fetiche. By and by, the confidence in the mokandas increased. Some merchant, very busy put off the payment till the other day, than another one, in want of certain articles for some days, deferred the payment till after their arrival. Today the us of such bills is diffused: any somewhat known European is able to procure all he wants by means of mokanda over the whole cataract region, and should some native hesitate to receive them it would not be for want of confidence, but for judging that the establishment where the payment is to be effectuated, is too far away, as among that unlearned people the mokanda can only be negociated on the spot; that is the weak side of it.

The introduction of a common coin will obviate this drawback. On the beginning it will be received as a mokanda of another kind, representing one or several monetary units now in use. But as its value will be visible and rapidly known to everyone the new mokanda will become negotiable between blacks and since that moment its use will become generalized.

At the time when the *Stanley*, the *Roi des Belges* and the *Ville de Bruxelles* where to be transported by means of a great number of native workmen, salaries were paid in mokandas in order to avoid the conveyances of great quantities of merchandises and such mokandas have been paid after the work having been done, say more than a month after their issue, at the stations ot the State. Had the agents charged with the matter, had at their disposal pieces of money, less fragile than the bills, less liable to loss, such pieces would have been received without any doubt, with eagerness. Consequently the workmen of the railway can be paid in coin, on condition of having from the very beginning an establishment at Matadi, where the black workman may be able to buy with that money any article he lusts after.

From the present, the « Compagnie des Magasins généraux » has resolved to create such an establishment. As the work will advance the use of the silver and copper coin created by the State will become general, as the highly practical spirit of the black will not be long in seizing the immense progress to be imported to the transactions by this new mode of payment.

SCHEDULE N° 22.

Land-Slip.

It has been already stated that the direction-line involves considerable cuttings and embankments only on the 26 kilometers of its length in that zone which extends from Matadi to Palaballa and by which the region of cataracts is limited down-stream.

In the said zone, there are to be found especially two categories of rocks, to wit : stratoïdal quartzites and very coherent schistoïds, as well as very foliated and generally friable micaschists. Sometimes the quartzites are impacted within the layers of micaschists, with which the alternate, principally at the base of the mass, the alternating layers sloping from 15 to 25° in the general direction of east-west.

The consequence is that in this region, whenever the disposition of the layers with regard to the direction of the valleys, facilitates the slip of the quartzites on the beds of the micaschists intercalated at the bottom, more or less considerable slippings are to be feared, while such catalysm is not to be apprehendend when the circumstances are contrary ones, that is to say, when we are on the opposite side of the slope of the strata.

Thus slippings happen sometimes in the impacted valley of the inferior Mpozo, where the geological layers slope on the horizontal line of the right bank towards the left one. So it happens that on certain points the ground of the right bank disaggregates and slips into the river. On the contrary, no slipping is to be noted on the left bank.

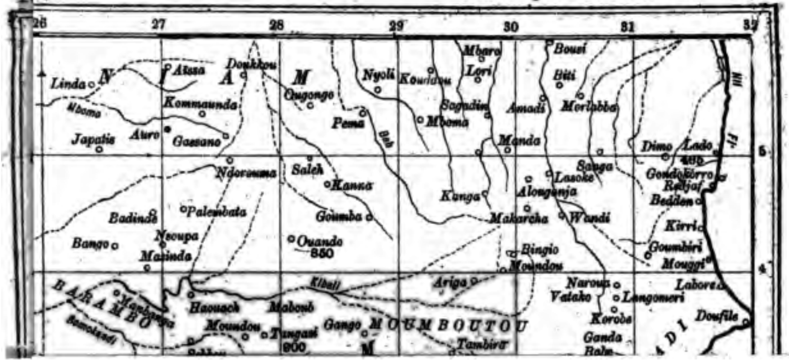
The reason is that the layers of the left bank, which continue the general slope of the layers of the right bank, instead of sloping towards the valley, on the contrary sink towards the body of the bank.

These special dispositions have bean taken into account for the determination of the direction-line and wherever a land-slip was to be apprehended, that bank of the valley has been chosen, the slope of which afforded the greatest security against land-slips.

As for the remainder of the direction-line, passed the first 26 kilometers, the maximum of the cuttings will not be superior to five meters, their development being very feeble; they are cut into argilo-sandy ground; the slopes of the natural ground are generally soft and the alluvions, which might be caused by the rain in the said cuttings would have no more importance than those caused by the same reasons in our countries.

U CONGO

Dressée par A. J. WAUTERS



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